

THE TREATMENT OF SCOLIOSIS.

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by

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THE TREATMENT OF SCOLIOSIS.

The Movement Curve in the Treatment of Scoliosis.

As the treatment of Scoliosis is the most noteworthy application of the movement curve, a case of Scoliosis on which the effects of these movements may be demonstrated is now brought forward. Before describing the treatment of Scoliosis, some remarks have to be made regarding the nature of the disease.

CHAPTER I.

The Nature of Scoliosis.

The name scoliosis signifies a lateral curvature of the spinal column, this curvature being invariably associated with a partial rotation of the vertebrae round their axes. A description of the various forms of scoliosis will be given in the first place, and will be followed by a full explanation/

tion of the rotation of the vertebrae. The forms of scoliosis are as follows:-

(1) Scoliosis ossicularis.

The pathological degeneration of the vertebrae which produces scoliosis ossicularis may be due to periostitis and osteitis of the vertebrae, to traumatic affections, to osteomalacia, to rickets, to arthritis, to syphilis, and to scrofula.

As a consequence of any of these conditions the vertebrae become impaired, suppuration, caries or necrosis supervenes, and finally the vertebrae either undergo degeneration or, as a result of plastic processes, the shape and size of the individual vertebrae and their relations to one another are altered.

Ankylosis or bony union of the vertebrae is a frequent consequence of such degeneration. Scoliosis brought about in this way usually presents special characteristics in each individual, so that a general law cannot be formulated.

(2) Scoliosis ligamentaria.

This arises from relaxation of the ligaments which support and give strength to the vertebral column, namely, the anterior common ligament, the posterior common ligament, the inter-vertebral fibro-cartilages/

fibro-cartilages, the intercrural ligaments (i.e., the ligamenta subflava), the capsular ligaments, the interspinous ligaments, the supraspinous ligament, and the intertransverse ligament. This variety of scoliosis is irregular in character, not following any general law.

It is recognised principally by individual vertebrae being no longer in line with the longitudinal axis of the spinal column, and simultaneously undergoing rotation round their axes, so that on external examination of the person's back the spinous processes are seen to project in one place and to be depressed in another, some vertebrae being displaced to the left side and others to the right.

(3) Scoliosis Muscularis.

This variety of scoliosis originates in the following way.

The vertebral column is protected against lateral flexion by muscles placed symmetrically on the right and left sides and antagonistic in their action. When this antagonism is no longer maintained the dorsal spine becomes curved to that side on which the muscular action is most powerful. The muscular antagonism may be interfered with when one of the mutually opposing muscles is either altogether absent/

absent or presents some irregularity of configuration; a second alternative is that one of the muscles may be either wounded, or inflamed, or paralysed, or affected with spasm; finally, one of the muscles may be contracted and its antagonist relaxed (atonic). This muscular contraction and atony are the most common causes of the condition in question.

The scoliosis produced in this way does not present characteristics varying with each patient, but follows a general law; so that scoliosis muscularis due to the contraction of certain muscles and the atony of others provides the best material for exhibiting the utility of the movement cure. That variety of scoliosis will therefore be the only one referred to in the following pages.

The remote cause of this scoliosis muscularis is a bending of the body towards one side or other, a bending which may be either habitually maintained or frequently repeated, and is incidental to various occupations, such as writing, or many kinds of work done by women, or carrying heavy weights constantly on the same side or frequent exercise of the same side or arm, or other circumstances of a similar kind.

By these positions and bodily activities certain muscular/

muscular structures (generally the same) are stretched and others are pressed together, the result being that from the interference with nutrition atony is established in the muscles which are often stretched, and contraction (or shortening) in those which are often pressed together.

Injurious influences are far more hurtful to persons of weak frame and no great muscular development, such as children and especially girls, than they are to those who are robust. The former are therefore naturally predisposed to scoliosis.

(4) Scoliosis pathica.

This variety of scoliosis is due to diseased conditions which do not directly injure or interfere with the vertebral column or the parts which are in connection with it.

Contractions (of the lower limbs) and lameness are often the first causes of scoliosis, for when the body takes an oblique position in consequence of shortening of the leg (foot) its balance is lost. Under these circumstances, by an effort imperceptible to the person concerned, the body strives to regain its balance, and endeavours to correct its oblique position by a compensatory spinal curvature.

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The contraction of the skin which remains after burns, and many other conditions may also produce scoliosis. The form of these scolioses is extremely variable, in accordance with the cause, position, and nature of the disease or lesion which produces them.

Scoliosis is also sometimes congenital, and then most frequently takes the form of scoliosis ossicularis, in consequence of one half of some of the bodies of the vertebrae being either atrophied or hypertrophied. Scoliosis muscularis is very rarely congenital; when it occurs the antagonist of some muscle is either altogether absent or is misshapen and unfit for use.

In all the varieties of scoliosis the muscles which maintain the lateral antagonism are either contracted or atonic, since they are pressed together on one side of the curvature and stretched on the other side.

These conditions in the various muscles and in the muscles opposed to them differ in each individual patient, not including, however, those who suffer from scoliosis muscularis due to contraction and atony, for in them the condition of contraction and atony are always very similar.

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In almost all scoliotic individuals the first curvature of the spinal column has associated with it a second curvature, directed to the opposite side of the body and produced by the natural effort that the oblique position due to the first curvature may be got rid of and the first curvature compensated.

This compensatory second curvature is very often quite irregular, but in scoliosis muscularis due to contraction and atony it always follows as a rule; therefore when we shall presently give a full description and explanation of this form of scoliosis, we shall also make more detailed mention of the compensatory curvature.

The curvature of the spine (*spina dorsalis*) is not in one direction only (*simplex*), but is almost always in the shape of the letter S (*sigmoidea*). In the first place the dorsal vertebrae are usually curved in a direction convex towards the right side and then the lumbar vertebrae are curved in a direction convex towards the left side, this latter curvature being shorter than the previously mentioned one, in fact about one half its length. The lumbar curvature is established for the purpose of compensating the dorsal one. In the last place the cervical vertebrae are curved with a slight convexity towards the left side.

In the great majority of instances the curvature formed by the dorsal vertebrae is directed toward the right side, and the condition receives the name of scoliosis dextra. Scoliosis dextra is far the most common.

In another modification of scoliosis the curvature formed by the dorsal vertebrae is directed towards the left side, and known as scoliosis sinistra, is not at all common.

When the vertebrae are formed into a curve, they undergo rotation round their axes in various ways.

The bodies of the dorsal vertebrae are turned to the right and their spinous processes to the left; the bodies of the lumbar vertebrae are turned to the left and their spinous processes to the right. The cervical vertebrae are rotated in the same manner as the lumbar vertebrae, but to a much less extent; at the same time the head is bent downwards.

All these rotations of the vertebrae round their axes are necessary, for the spine without such rotation can only be bent to a very slight degree, because the transverse processes of the vertebrae would soon come into contact on the concave aspect of the curve and prevent any further bending of the spine.

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The vertebrae must therefore rotate in such a manner that the transverse processes shall not touch one another as a result of the curvature; this is the case if the bodies of the vertebrae always turn towards the convexity of the curve, and the spinous processes towards the concavity, in such a way that each vertebra undergoes a greater rotation than the one below it and a spiral is formed by the rotation of the entire vertebral column. The effect of this is that in the concavity the transverse processes do not come into contact; but each one can be depressed by the side of its next neighbour. If the rotation were in such a direction that the bodies of the vertebrae turned towards the concavity, no curvature at all could take place, for the bodies of the vertebrae would resist the compression which is produced by the curvature.

But if the bodies of the vertebrae turn towards the convexity they are not compressed during the curvature, but each is drawn away from the next with simultaneous stretching of the ligaments.

The following changes are produced by the rotation of the vertebrae. The ribs on the right side of the body become extremely prominent laterally and behind, and the intercostal spaces are enlarged; the right scapula is moved up; the sternum (its lower/

lower portion principally) is moved to the right; the space between the sternal and acromial insertions of the clavicle is diminished on the right side. The ribs on the left side of the body recede laterally and behind, the intercostal spaces become narrowed, the left scapula sinks down, the interval between the sternal and acromial insertions of the clavicle is increased on the left side.

The right shoulder is turned forwards, and the left shoulder backwards, for after they have been thrown out of line by the twisting of the thorax, the patient endeavours to bring them into line again.

On the left side the lumbar and pelvic region projects posteriorly; on the right side it recedes posteriorly, the right trochanter major is in front, the left trochanter major is behind.

The pelvis and legs share but little in the change produced by scoliosis muscularis, possibly because in the great majority of instances scoliosis is dependent on sedentary positions in which the muscles of the leg do not act.

The following cases of scoliosis were treated in the Royal Alexandra Hospital with a great deal of success. The Royal Alexandra Hospital has a special orthopaedic department, and consequently I see a good many scoliotic cases.

I am not in favour of spinal supports for scoliosis, as I am convinced that they tend to weaken rather than strengthen the patient. The majority of medical men prescribe a spinal support of some sort for the patient. From the large number of cases which I have seen in this hospital, who have discarded the support under our advice, and who have given us such satisfaction, I strongly condemn any sort of spinal support for scoliosis, and the reasons I give are the following:-

- (a) The muscles of the back, instead of developing, as the child grows, become wasted, and consequently the child's back becomes very weak.
- (b) A spinal support makes the patient more or less an invalid.

The exercises which I recommend to be employed in the treatment, develop the muscles of the back, and indeed the whole body, and instead of the child lying down for several hours during the day, he is allowed to go about like other children and take as much exercise as he can. During my tenure of office here/

here I have seen really wonderful results in a comparatively short time. Patients who have come to us with severe lateral curvature and at the same time very much run down from wearing spinal supports, very soon gain muscle and activity.

I have had three cases under my care who had early tubercle of the lung, and who could hardly do the simple exercises at first, becoming exhausted quickly. Well, after a month of muscular movements and postures these patients all showed a great gain of muscular power and general health. At the end of three months they had become different beings. They were able to do the hardest exercises along with the other patients.

The majority of my patients have been servant girls, and a class a little above servants. In cases where the osseous deformity is marked, the exercises cannot cure the patient; the deformity remains the same, but the patient is taught to hold herself in the best possible position and this, with a development of the muscles of the back, makes the girl an entirely different individual as regards her back, and indeed, her general health. Where there is no osseous deformity and the case is seen early, a rapid cure is usually the result. The patient starts/

starts with simple exercises for the first week; and the harder ones are gradually learned by the patient, until three months' exercises have been done in hospital, when she is given a Home prescription to carry out herself. This prescription consists of an entirely different set of movements which are taught her two days before going home. She continues these exercises for at least a year, so as to get the muscles and the back as hard and straight as possible. It is my duty to record the amount of osseous deformity when present in the cases of lateral curvature treated at the Royal Alexandra Hospital. The method I employ, and which I think the best and simplest, is the method of Scoliosiometry which was first described by my chief, Mr Bernard Roth. The apparatus required is, a piece of rolled tin made in the form of a tape, which is very convenient and easily carried about. The "Scoliosimeter" is made of tin, five-eighths of an inch wide, twenty inches long, and one-twentyfifth of an inch thick. It is always necessary to take a posterior tracing of the ribs, and this is done as follows:

The patient, with feet together and the knees well extended, flexes the trunk as far as possible, the arms being allowed to hang down loosely. The lower/

lower angle of the left shoulder blade is felt, and, fixing one end of the metal tape with the left hand at that point, the tape is moulded close to and over the left ribs, across the spine, over the right ribs to the lower angle of the left shoulder blade, which is also to be looked for. The tape is marked opposite the dorsal line (as will be seen in drawings later on) and is removed. The upper edge should be placed on a sheet of paper and a tracing made inside the concavity of the tape. Whatever level the deformity of ribs posteriorly, it is marked on the tracing. A record should also be taken of the loins, and is usually midway on each side between the last ribs and the iliac crests, always marking the tape where it crosses the spine. This record is traced on a sheet of paper and the third lumbar vertebra marked off (as will be seen in the drawing later on). The tracings should on no account be taken while the patient is erect, as the records will be practically useless. If necessary an anterior tracing can be taken from one axilla to the other.

In my experience I have seen various forms of lateral curvature, and they are classified as follows, viz:-

(a) When the curvature has the whole of the convexity to the left it is described as resembling (the letter *C*).

(b) Curvatures with the whole convexity to the right are described as resembling (the inverted letter **D**).

(c) Curvatures with double curves, the dorsal or upper ends being convex to the right and the lumbar or lower curve convex to the left are described as resembling (the reversed letter **2**).

(d) Curvatures with double curves, the dorsal or upper curve being convex to the left and the lumbar or lower curve convex to the right are described as resembling (the letter **S**).

The normal antero-posterior curves of the spine are nearly always affected in lateral curvature: the lumbar hollow, becomes convex instead of concave posteriorly; the head projects forwards, the anterior chest walls become flattened, and the abdomen becomes unduly prominent. This typical stoop has been described by Mr Roth for a good many years now as the "gorilla" type.

The first symptom in lateral curvature is pain in the back, generally in the small of the back, and sometimes between the shoulder blades. Fully 60 per cent. of the cases I have treated complained of pain.

I have asked all my patients to describe the characteristic/

characteristic pain, and nearly all have agreed to its being of a dull aching character.

So far as my experience goes this dull aching pain disappears in about a week or a month after the exercises have been started. Few of the extreme cases of lateral curvature that I have seen never complained of pain in the back.

Method of Examination for Lateral Curvature
adopted at the Royal Alexandra Hospital for Sick
Children, Brighton.

A history of the patient's case is obtained, and see if there are any predisposing causes, and the condition of the patient's general health. In young women the state of the menses should be inquired into; many are irregular in their courses. Whether there is any backache or not. School life should also be inquired into. The patient is asked to undress and the dress in case of females is fastened round the pelvis below the level of the iliac crest, so that one can see the gluteal cleft. This is important as one gets a perfect view of the whole length of the spine. Many cases (of lateral curvature) of lateral curvature have gone undiagnosed, simply because the examining surgeon omitted to remove the dress low enough and thereby get a clear view of the spine.

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It is impossible to detect some cases of lateral curvature if this simple precaution is not observed. The boots should also be removed, as one is desirous of examining the feet for the presence or absence of flat-foot.

Along with the individual cases which I shall describe later on, will be some sketches of the patients' backs and spines while in the habitual position. The patient should now be inspected laterally for the degree of "gorilla" type, whether slight or severe, and in front noting any inequality in the mammae, the trunk should now be flexed as far as the patient can go, the knees being well extended and the arms allowed to hang down loosely, so that the scapular muscles are relaxed. The next step to take is to determine the level of the ribs posteriorly, should be examined for any inequality.

If there is any deformity as seen in cases of reversed letter ² scöliosis, the right ribs will be unduly prominent. A scoliosimetric tracing of the ribs posterior is taken, as already mentioned. A record is also taken of the loins, usually opposite the third lumbar vertebra. The next step is to ascertain to what extent the spine can be restored to its normal position by a voluntary effort, with the/

the aid of the examining surgeon. Where there is no osseous deformity of the ribs and vertebrae and if the thorax be thrown out, the abdomen withdrawn, the shoulder blades and iliac crests symmetrical, and the head erect, the "best possible position" will be perfect. I was astonished at first, to see the quick change from a crooked back to a practically straight one, just by the posture which the patient is made to assume. I describe the above as the postural or non-osseous, that is to say, there is no bony deformity. When the bone is affected, it is spoken of as the osseous stage and the improvement will be limited to the extent of the bony deformity.

I usually direct the patient to hold one arm upwards, and the other arm outwards, and this is very often useful in helping to partially restore the symmetry of the trunk. In some cases I direct them to raise both arms vertically by the side of the head, and making them grasp the elbows above the head. Both arms being extended upwards by the sides of the head and one wrist grasped very often gives what is looked for. The patients' trunks and arms are put in the best possible position and this is known as the "keynote" of the exercises which they have to practise/

ise during their treatment.

If a correct prognosis of lateral curvature is at all desired, the patient should be put in the "best possible position" as soon as she sees you. A great muscular effort is required to maintain this new position, and she soon feels uncomfortable.

Attention should be paid to the dress, as one finds it impossible to get any work out of them in their usual dress. Everything will be found too tight across the chest when the patient is kept in the "best possible position", therefore, she must either widen the garments, or make a loose bodice which will give her plenty of movement.

Treatment.

If there be any inequality in the lengths of the lower extremities they should be corrected by wearing a thicker sole on the shorter leg.

A patient suffering from scoliosis may lie on the back for a few minutes at a time in order to relieve pain, when the exercises have produced exhaustion. I have directed several of the patients who attend this hospital to do so when fatigued, and I have found that they lose all pain after a few minutes rest, especially those who have newly commenced treatment.

I shall endeavour to describe the treatment we adopt at this hospital.

(a) Re-education of the patients' muscular sense as to an erect or improved position.

(b) Improved position to be maintained at all times, while sitting or standing.

(c) Attention to dress.

(d) Systematic training of the spinal and other muscles, including the development of the thorax.

(e) Attention to general health.

(f) Subsequent home treatment to prevent relapse in the improvement or curve that has been obtained by the surgeon.

(a) Re-education of the patient's muscular sense.

The patient must lie on his or her back in the best possible position, and practise slow breathing, the shoulders at the same time being kept pressed back by a voluntary effort.

(b) Improved position to be maintained at all times, while sitting or standing.

If the patient sits on an upright, well-padded chair with his or her shoulders, sacrum and loins well supported against the back, this is all that will/

will be required.

(c) Attention to dress.

The articles of dress worn by a scoliotic patient should be as loose as possible, the best way of testing this is to make the patient stand (with her back to the wall) in the best possible position, and with the clothes opened in front. The girls who attend this hospital are advised to wear a wool combination next the skin, which must be thick in winter and light in summer, and a knickerbocker made of wool, and an outer dress. The stays must be loose and not drawn tight enough to leave any mark on the skin.

(d) Systematic training of the spinal and other muscles and the development of the thorax.

The antero-posterior curves of the spines are the first to be corrected; when these have improved, then the exercises for correcting the lateral curvatures are begun.

The following exercises are the ones I employ with the cases which come under my care.

1. The patient lying on her back; arms by the sides of the body; palms upwards; slow, deep inspiration by the nose; slow expiration by the mouth. This I direct to repeat about six times.

2./

2. A similar exercise with her arms extended upwards by the sides of the head (repeated four to six times).

3. The patient now occupies the same position as No.1; head, i.e, neck rotation on axis to right and left alternately; also lateral flexion of the head (neck).to right and left alternately; repeated about four times.

4. Patient lying on back; simultaneous circumduction of both shoulder joints from before backwards: elbows and wrists must be kept extended. (repeated twenty times).

5. Patient lying on back; one hip circumduction from within out, and from without in; knee kept extended (repeated 12 times).

6. Patient lying on back; simultaneous quick extension of the arms upwards, outwards and downwards, from a position with the elbows flexed and quite close to the trunk; the flexion of the elbows being slowly executed (repeated six times).

7. Patient lying forwards; one hip circumduction from within out, and from without in; knee kept extended (repeated 12 times).

8. Patient sits on a couch, with back at an angle of 45"; ankle circumduction down, in, up and out/

out, while the toes are directed inwards the whole time (repeated twenty-five times). Also foot abduction, patient resisting; and foot abduction, surgeon resisting (repeated 8 times). This exercise is good for flat foot.

9. Patient astride a narrow table (made specially), with arms down and hands supinated; trunk flexion at lumbar vertebrae, patient resisting slightly while maintaining the best possible position, followed by trunk extensions, operator resisting by his hand still against the back of the patient's head or neck (I prefer the neck as it is more convenient for the operator); also trunk rotation on its axis, alternately to the right and left, while the operator resists by grasping the patient's shoulders (repeated four times).

I always get one hand behind the right shoulder, and one in front of the left shoulder and tell the patient to rotate from left to right, at the same time resisting the movement with my hands. When I get the patients under my care, for the first three or four days this exercise can hardly be done; but in a fortnight or so the patient gets much stronger, and I am compelled to increase the resistance.

10. Patient, with arms extended upwards, stands with/

with head, back and heels against a vertical post with pegs on each side which she grasps. (This must be of thick wood and well made). The operator gently pulls the patient's pelvis forwards by his hands on the sacrum, patient resisting; and then the patient moves back the pelvis to the post operator resisting. The patient's heels must on no account be raised from the ground.

11. Lying on back, with arms extended upwards by the sides of the head; flexion of both arms, operator resisting by grasping hands, followed by extension, patient resisting (repeated three times). The patient's knees, flexed over the end of the table.

12. Lying on back, with head and neck projecting beyond the end of the table; arms by the side of the body, palms up; the head is slowly flexed by the operator's hand on the occiput, patient resisting, followed by head extension, operator resisting, (repeated 4 times).

The patients should rest for at least two minutes between each exercise, but they rest a much longer time here, as frequently I have as many as fourteen patients to exercise and I always go through one exercise with all the patients before starting another. The patient should sit on a chair with a high/

high back; with arms hanging down at sides and palms forwards. During the various exercises I direct the patient to count, one, two, three, during the movements so that respiration should not be interfered with by involuntary fixation of the chest walls.

After all the exercises are gone through, about twelve "stroking" in a longitudinal direction from above down of the patient's back by operator's palms, which remove any aching caused by the exercises.

The exercises should be repeated daily; and as the patient gets stronger, other and severer exercises are gradually added.

In a couple of days, if the patient does not experience much fatigue, the following standing exercise is done:-

A low padded horizontal bar is fixed in one of our rooms, and the patient with heels fixed against a ledge attached to the structure of the horizontal bar, and front of thighs just above level of knees against a horizontal bar which is padded with soft material, while patient holding herself as erect as possible, the operator then flexes the patient's trunk by pressing his hand against the back of her head, the patient at the same time resisting; and the patient slowly recovers the erect position against the resistance of the/

the operator; also trunk rotation on its axis going from right to left while the operator resists by grasping patient's shoulders (This exercise should be done 4 times).

After a fortnight's treatment, a severer exercise is now tried, and is known as Forwards lying, heels fixed, trunk extension and flexion, also twisting of the trunk. The patient lies in the prone position, with the pelvis and legs supported and the heels fixed (the heels always fixed by someone sitting on them, usually a patient about the same weight) on a padded table, while the whole of the body to the level of the iliac crests projects beyond the edge of the table.

The patient raises the trunk into the same horizontal line as the legs and pelvis, and even higher, and then slowly allows the trunk to be again flexed by its own weight. When this exercise is first begun the patient is able to bear very little pressure, but after a few days more pressure can be exerted by placing one hand at the back of the patient's head and press downwards.


After this movement is done four times, the patient rotates the trunk on its axis, while the operator resists by grasping the shoulders. This is/

is also done about four times. At first the arms are close to the sides, but after a week the arms are extended upwards by sides and head, a stout roll of cloth is grasped. Another exercise which is even more severe can now be started and is described as "Long sitting, feet fixed, trunk extension and flexion; also twisting of the trunk." The patient sits on a padded table, with her legs close together and the knees extended. Another patient about the same weight sits on legs just below knees. The patient, while keeping the best possible posture, slowly extends the spine against the operator's resistance (I always apply resistance by placing one hand against the back of the patient's head) till the trunk is in the same horizontal position as the legs; the patient slowly resists, while the operator raises her into the vertical position of the trunk; this is done three or four times.

The patient should now assume the best possible posture while in a sitting position, and slowly rotate the trunk on its own axis to the right and left, while the operator resists by grasping patient's shoulders; this is done three or four times.

In doing the hip circumduction weights are applied from time to time. Half pound shot bags are used/

used at first and these weights are gradually increased up to five pounds, at the end of the three months' course.

In the ordinary cases of reversed  lateral curvature (which I have described already) the "key-note position" will be one with right arm directed vertically upwards by the side of the head, and the left arm either directed horizontally outwards or grasping right wrist; in cases of severe osseous deformity of ribs and vertebrae and other cases, the best "keynote" position is often one with elbows firmly clasped above head (as will be seen in the cases which I shall describe later on). In cases of non-osseous deformity one or two months' daily treatment will effect a cure; while the "osseous" cases three months' daily treatment will only make the back straighter and arrest any further increase of the deformity into the ribs and vertebrae. The advantage claimed for this treatment of lateral curvature over spinal supports, is that it always tends to improve the general health of the patient, and I thoroughly believe in the above, as everyone that has been a patient in this hospital has made marked improvement, both in general health and in their deformity.

(e) Attention to general health.

The general health should be improved as much as possible. It is a rule in this hospital that all orthopaedic cases are to be weighed on admission and from time to time. The improvement shown in weight in a good many of the cases is marked. Another of our rules for orthopaedics, is a daily morning bath before the exercises.

At the expiration of the three months' course, a home prescription is given the patient, and this is to prevent relapse.

Mr Bernard Roth prescribes the following exercises for the patients leaving the hospital.

Half an hour twice daily for six months, then once daily for another six months.

1. Lying on back, arms directed upwards by the side of the head; full inspiration by the nose; slow expiration by the mouth; also same with arms down by sides of the trunk, palms upwards (repeated three or four times).

2 . Sitting astride a chair, with the arms directed upwards by the side of the head and holding a stick, trunk lumbar flexion or extension; also trunk rotation on its axis to the right and left; also/

also the same trunk movement with the arms down by the sides of the trunk, palms forward (repeated three times).

3. Lying on back, arms down by sides of the trunk, palms upwards; head rotation on its axis to the right and to the left; also head lateral flexion both to the right and the left (repeated four times).

4. Lying prone on the ground; heels fixed by someone holding or sitting on them, or by means of a strap fixed on the ground; arms as in 2.; trunk raising and trunk lowering; also trunk rotation on its axis to the right and to the left (repeated three times).

5. Lying on back, with arms by the sides of the trunk, palms upwards, one hip circumduction from within out and from without in; the knee kept extended the whole time (a shot bag weighing five to ten pounds for children and women, and ten to twenty pounds for youths and men, is attached to the foot to increase the severity of the exercise. (repeated ten times).

6. Lying on back; slow simultaneous circumduction of both shoulder joints from before backwards; elbows and wrists extended the whole time (repeated twenty times).

7. Lying prone on the ground, with heels fixed as in 4.; trunk kept raised from the ground (extended) simultaneous extension of the arms upwards, outwards and downwards, from a position of elbows flexed and close to the trunk.

8. Standing with back against door, arms directed upwards, and hands grasping two pegs fixed in the lintel above the door; pelvis rotation on vertical axis to the right and to the left (repeated twelve times) also the same exercise hanging with the feet raised off the ground and the sacrum kept touching the door (repeated three times).

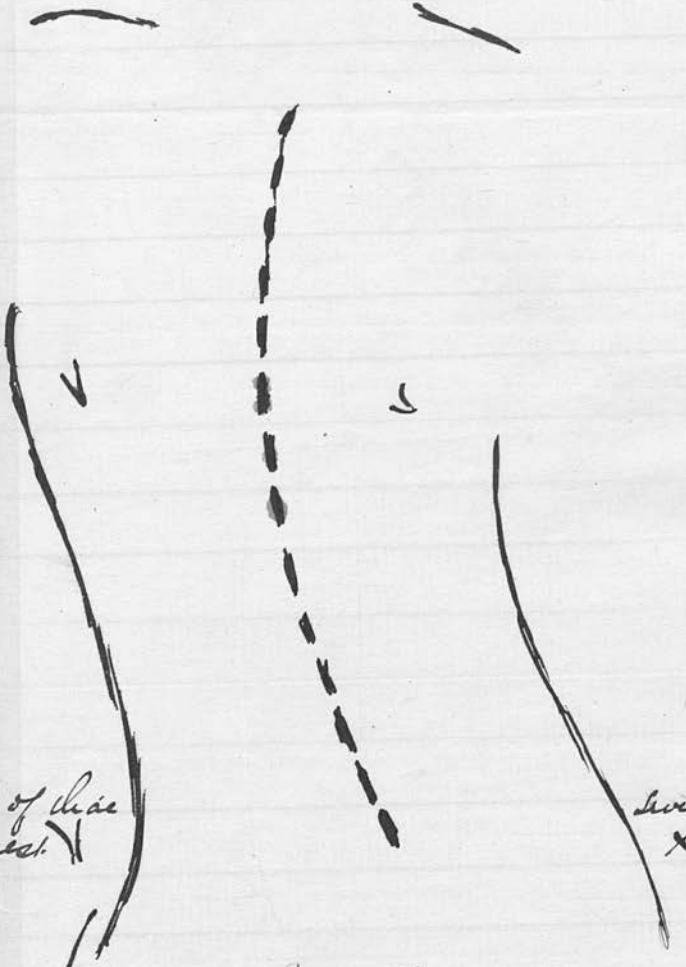
9. Lying prone, the forehead supported on the hands, placed one above the other; one hip circumduction from within out and from without in; the knee kept extended the whole time (a shot bag, weighing five to ten pounds for girls and women, and ten to twenty pounds for youths and men is attached to the foot to increase the severity of the exercise. (Repeated ten times).

10. Walking backwards and forwards with the arms directed upwards by the sides of the head and holding a stick, also with the arms directed downwards with the palms forwards (one hundred steps in such position).

The patient is usually examined at the end of the first twelve/

twelve months, and I have seen splendid results in cases that left the hospital one or two years ago.

Mr Roth usually prescribes Nos. 4, 8 and 7 of the first home prescription for another two years, to be practised every morning. Good positions require a deal of perseverance, but it is necessary to do so.



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May 11.



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CASES.

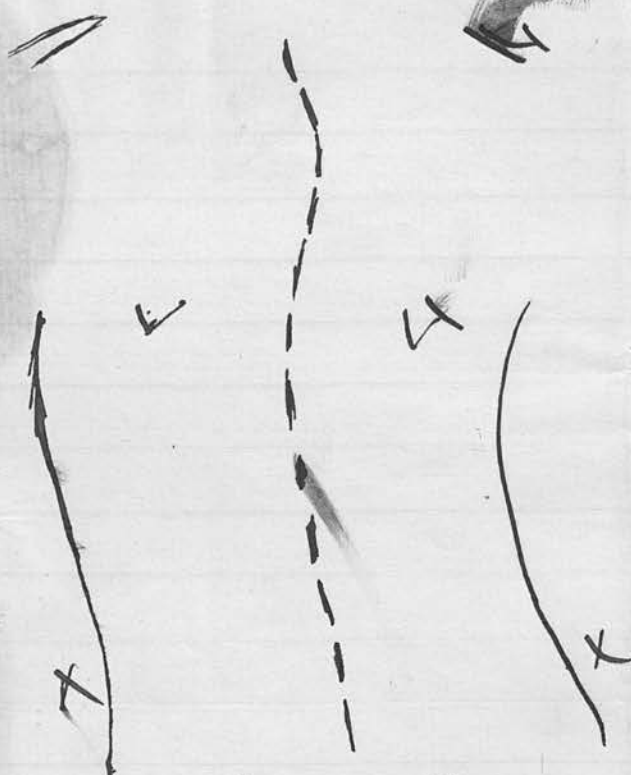
The following cases were patients treated in the Royal Alexandra Hospital.

Case I.

Mary W., aet. 12 years. Patient is youngest but one of seven children, and enjoyed good health till six months before coming here. She then began to have backache, especially after exertion of any kind. During the last year her mother states that she has grown several inches taller, and this in all probability accounts for this weakness of the spine. Some months ago her mother noticed that one side was slightly higher than the other, and the curve gradually grew worse and now presents the following outline. (See sketch.)

She was thoroughly examined, and advised to start treatment the following day.

After a week's treatment, patient complained very little of backache and three weeks treatment the backache completely disappeared. After one month's treatment/



Miller T. (Case 2)

treatment she was examined for a second time and the following keynote position was assumed:- Right arm extended up and left arm extended out. Viewing the patient posteriorly when she was in this position the back seemed perfectly straight. After this examination the patient went through all the exercises (which have been described already) in her "keynote" position.

At the end of three months' treatment the muscles of her back were developed, and she was able to hold herself in a good position. She was discharged as cured, after having been instructed in the "Home Prescription". This patient is now doing well, and shows no sign of relapse.

Case II.

Millie T., aet. 13. The mother of this girl was unable to give us any definite time when she noticed the child's back becoming curved. However, she says it has been crooked for some years. The patient was somewhat wasted and taller than girls at that age. On examination the whole spine was found to be curved to the left, showing marked gorilla type. There was scarcely any osseous deformity. After the examination was completed she was put in the best possible position, ^{and} commenced her exercises on/

on the following day. This patient also complained of backache between the shoulder blades whenever she exerted herself, or walked a long distance.

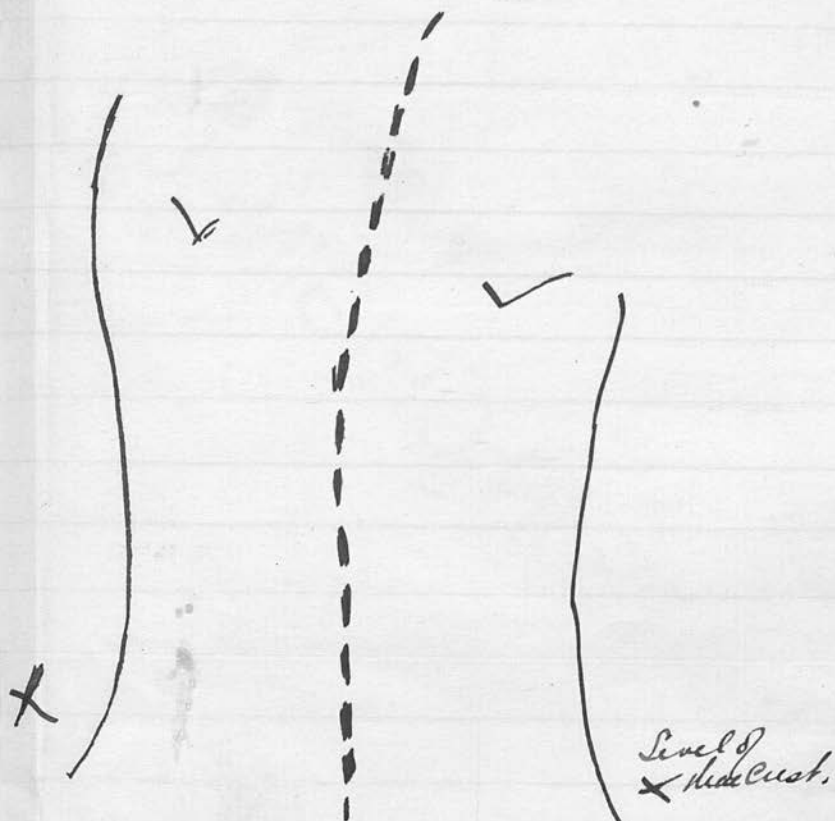
The backache gradually disappeared after the first fortnight, and patient was re-examined at the end of the first month, when we found marked improvement. "Keystone" position:- Right arm up, and left arm out. When she was told to push the right arm up as much as she could, the back looked almost straight, so that position was given her during the exercises. After three months' treatment patient was discharged as "relieved". Although the back was not quite straight, I venture to say this case was very satisfactory.

The muscles of her back became so well developed that we had to use no little force in doing some of the exercises. She was given the Home Prescription and told to come and see us in twelve months' time.

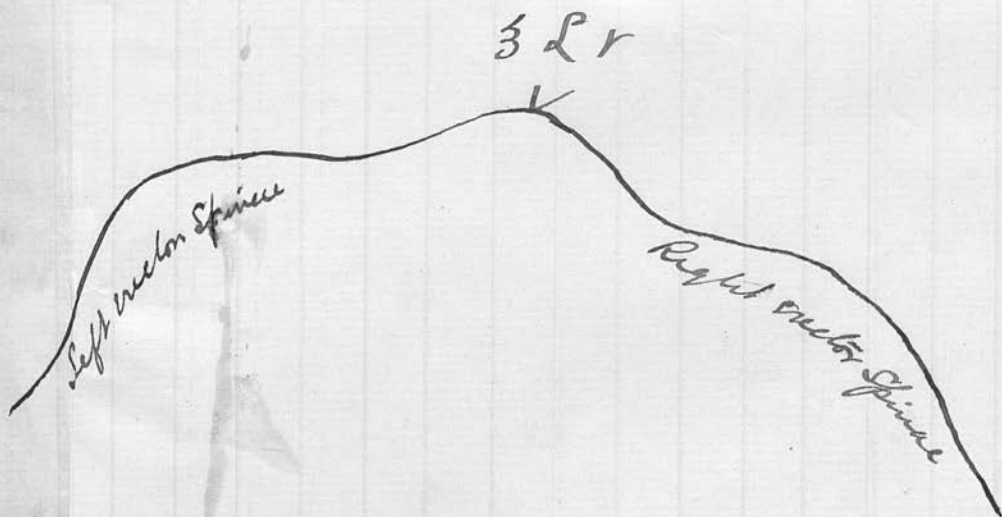
Case III.

Lillie P., aet. 14 yrs. Only child.

History: Mother says that patient's back has been projecting for the past twelve months. She had occasional backache between the shoulder blades (scapulae) from time to time. She never wore any sort/



Billie P. (Case 3)



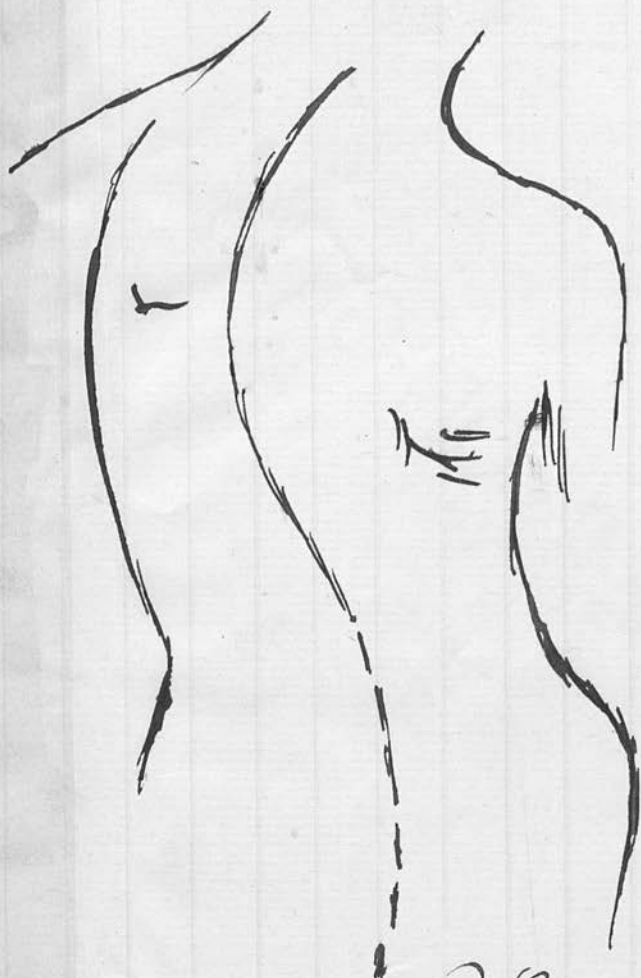
sort of spinal support. The accompanying rough sketch on admission will give an accurate idea of the deformity.

After doing the exercises for a week or two the backache gradually disappeared and after a month's treatment she was re-examined, and told to grasp elbows above head. This position was her "keynote" position, and one which gave the best result in such a case. She took exercises for three months and at the end of that time was discharged as "relieved".

She was given the usual Home Prescription, and as far as we know, there has been no relapse.

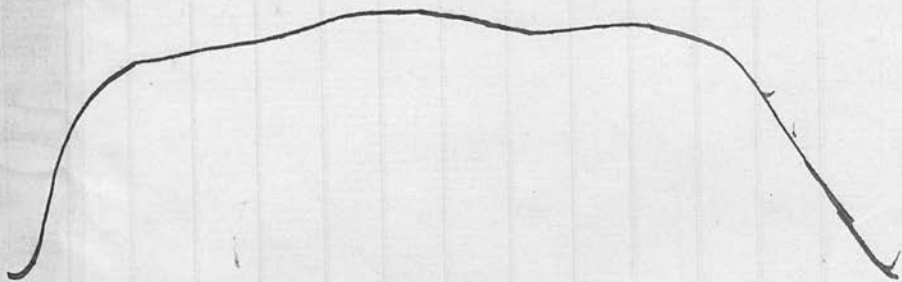
Case IV.

Alfred P., Aet 12 years. Patient youngest of ten children and has had this deformity of the spine for several years. When nine years old, a surgeon ordered him a poroplastic felt spinal jacket, as well as to rest on a sofa for a few hours during the day. Patient has worn this jacket since he consulted this doctor and has been gradually getting weaker in both legs. Backache makes its appearance off and on. The patient presents extreme lateral curvature with dorsal (upper)convexity to the left. (The rough sketch at the side shows the great prominence of the lower/



Alfred P. (Case 4)

V 3 L.V.



lower angle of the left scapula and the right iliac crest.) The abdomen in this patient was very prominent and the patient exhibited the gorilla type, i.e. exaggeration of the antero-posterior curves. The other tracings represent the scoliosimetric tracings of the ribs posteriorly and the erector spinae muscles. On the posterior aspect there was extreme torsion of the dorsal vertebrae.

He was put through a course of exercises of three months' duration, discharged as "cured".

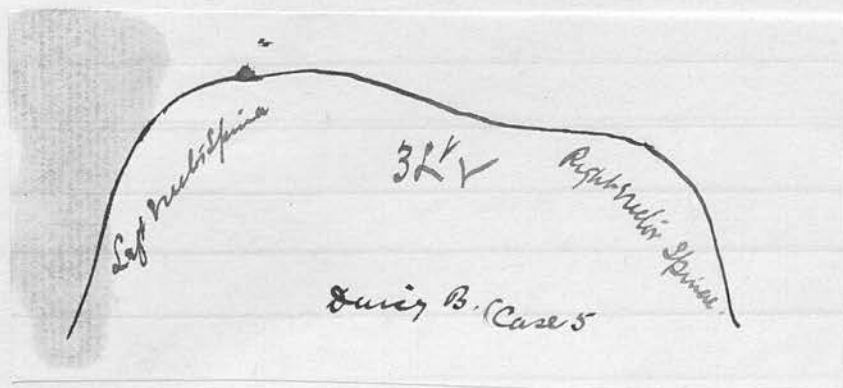
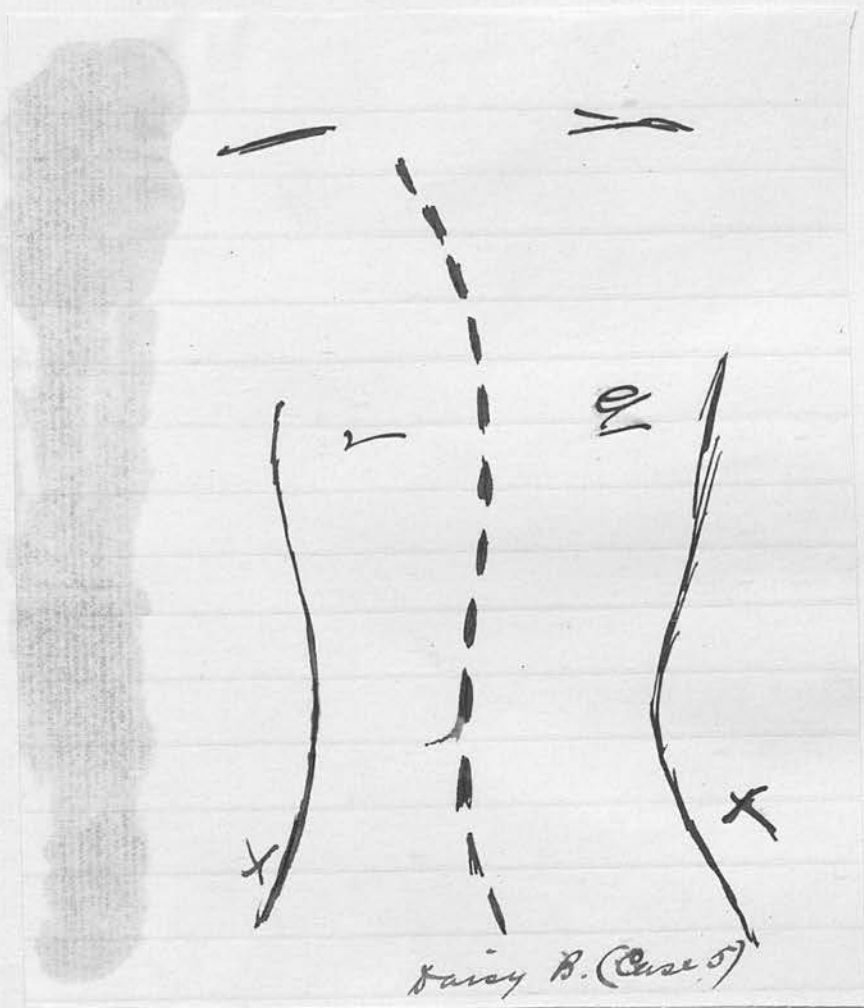
The home prescription having been taught him before leaving; there has been no relapse, and the result is an arrest of the deformity, if not a perfect cure.

Case V.

Daisy B., aet 9 years. Patient showed slight lateral curvature on admission. She is one of twins. A fortnight ago mother noticed something wrong with back. General health of child was good.

The rough sketch at the side will show you that the case was not a bad one, one which was readily amenable to treatment.

She underwent a three months' course of exercises, and at the end of that time was able to hold her/

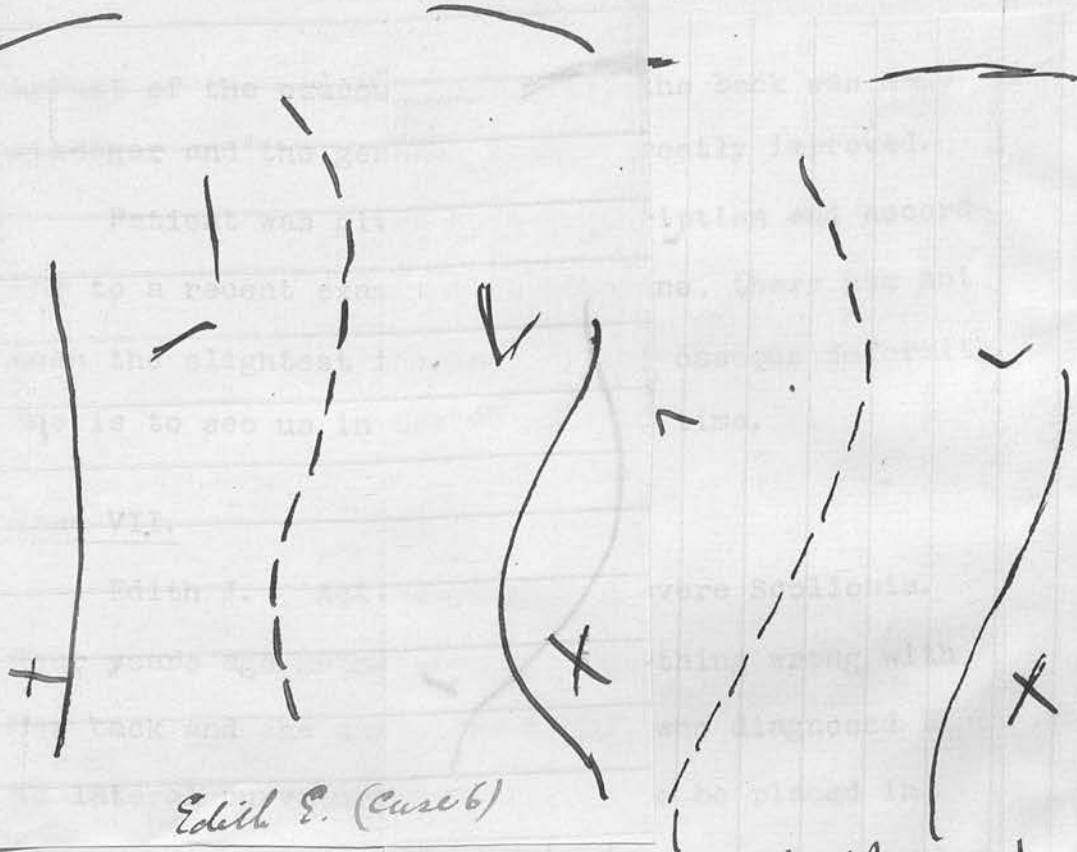


her back in a perfectly straight position. After the first month she made marked progress, and she was told to grasp elbows above head ("keynote" position), as in this position patient's back was found to be quite straight. This little patient was discharged as "cured", and as far as I know has not relapsed in the slightest.

Case VI.

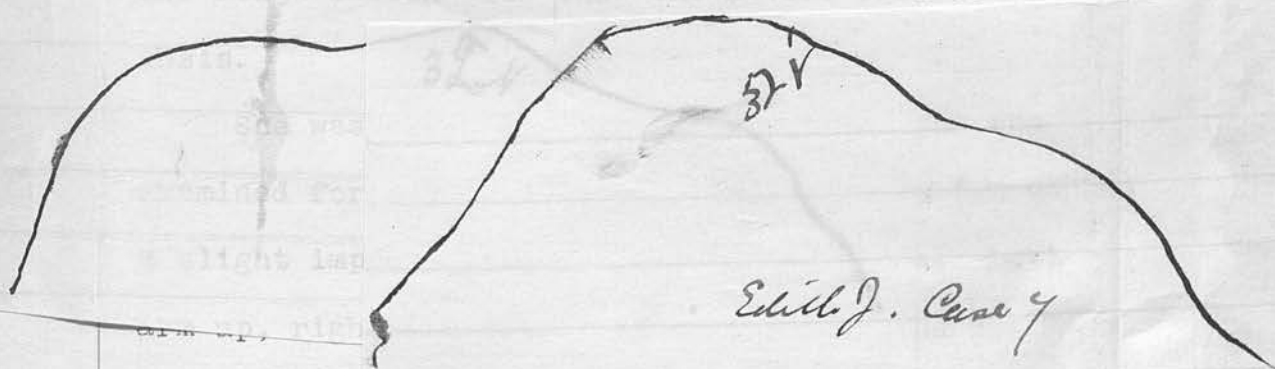
Edith E. Aet. 14 years. Three months ago dressmaker noticed that there was something wrong with patient's back. Backache comes on two or three times a week, and of a dull aching character. The sketch which is at the side will show marked curvature. On examination the osseous deformity was found to be severe. A three months' daily treatment was decided on, and patient examined the following day. As in the other cases, the backache gradually disappeared, and a month patient felt no discomfort whatever.

After a month the usual examination was made, and the result was satisfactory. "Keynote" position, elbows grasped above head, was the one ordered. She made steady improvement and was discharged at the end of three months as "relieved". There was complete arrest/



plaster of Paris for

Edith J. (Case 7)



decided impr

with a Home Prescription. She was seen some months afterwards, when the osseous deformity was found to be in statu quo. To be seen in two months' time.

Case VIII.

Stanley/

arrest of the osseous deformity, the back was made stronger and the general health greatly improved.

Patient was given Home Prescription and according to a recent examination of spine, there has not been the slightest increase of the osseous deformity. She is to see us in twelve months' time.

Case VII.

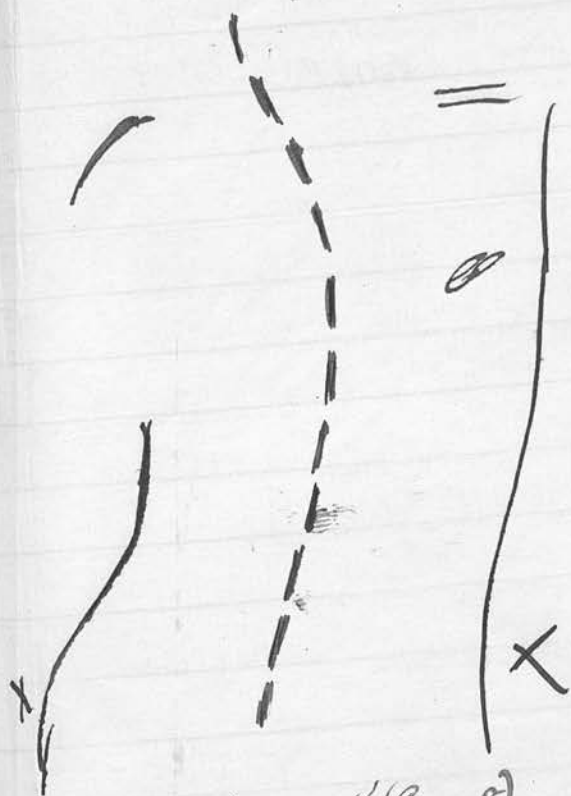
Edith J. Aet. 9 years. Severe Scoliosis.

Four years ago mother noticed something wrong with her back and she consulted Dr M., who diagnosed it as lateral curvature and ordered to be placed in plaster of Paris for six months. Patient never had any backache and the general health fairly good. The rough sketch will show the severe form of scoliosis.

She was exercised for a month, when she was examined for a second time. This examination showed a slight improvement. "Keynote" position: Left arm up, right arm out. After three months she made decided improvement and was discharged as "relieved" with a Home Prescription. She was seen some months afterwards, when the osseous deformity was found to be in statu quo. To be seen in two months' time.

Case VIII.

Stanley/



Stanley K. (Case 8)

Stanley K., aet 6 years. Patient has been on one side last six months. The sketch will show a severe cervico-dorsal curvature to right. This is a very marked case of scoliosis.

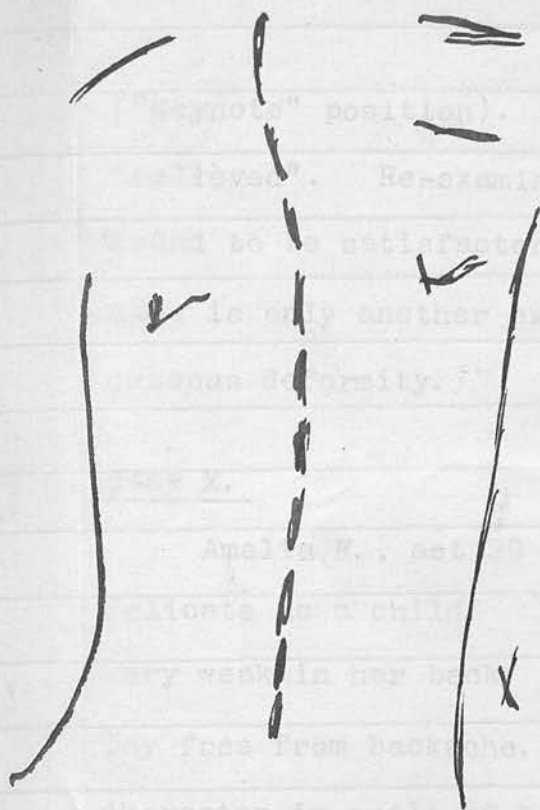
Advised to have three months' treatment. Improvement after first month and "keynote" position given, viz: Left arm up, right arm out. After three months this patient was also discharged as "relieved" with the usual Home Prescription. Seen several months afterwards and osseous deformity was found in statu quo.

This case has been a most satisfactory one, considering the state of the patient on admission.

Case IX.

Maud P., aet 12 years. Patient has been delicate since birth. Mother noticed patient's back growing out for the past two years. Patient shows the "gorilla" type. Complained of severe pain between the shoulder blades whenever she went long walks.

Three months' treatment prescribed. After a month's treatment the pain got less, but did not entirely disappear until near the end of three months. At the end of one month there was satisfactory progress and she was made to grasp elbows above head ("Keynote")/

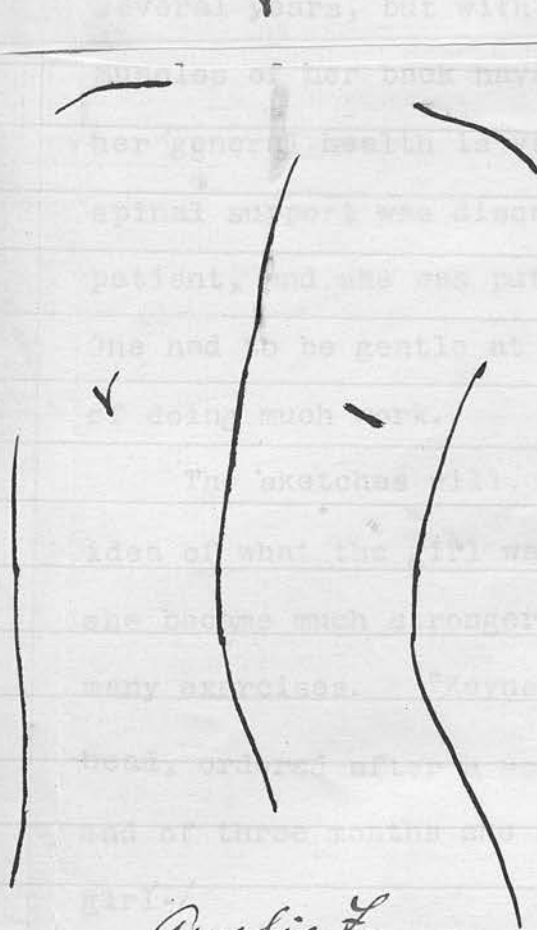


Maud P. (Case 9)

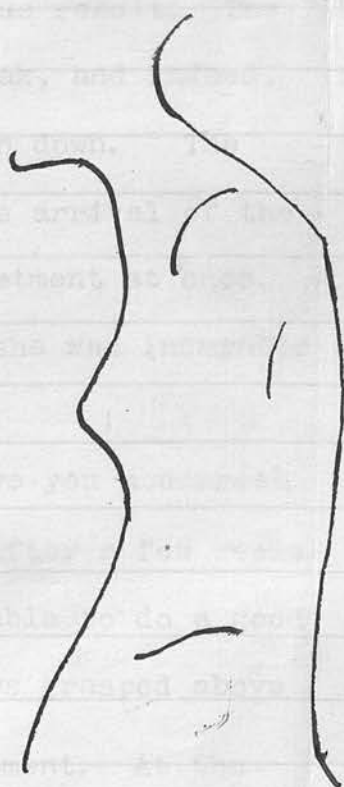
"Grilla"

Maud P.

spinal support for



Amelia F.
Case 10



Amelia F. (Case 10)

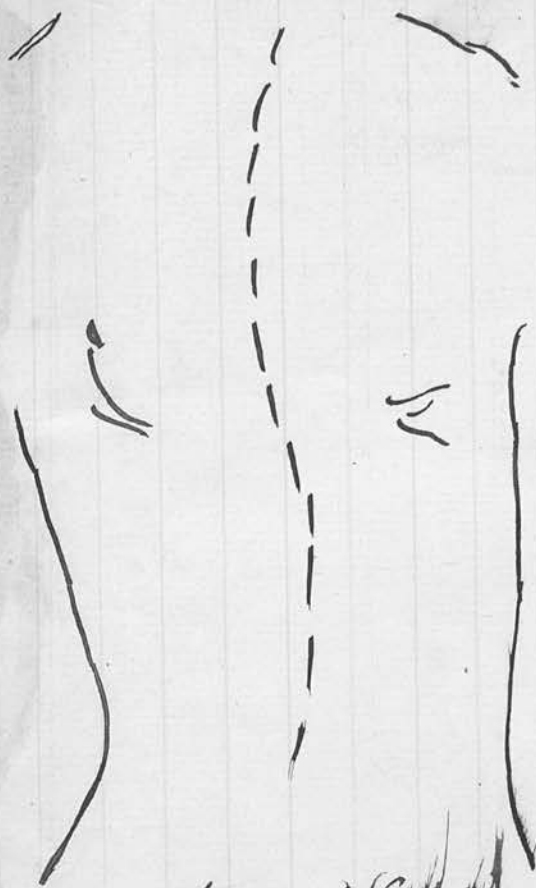
"Grilla"

("Keynote" position). She was discharged as "relieved". Re-examined after several months and found to be satisfactory. Same Keynote. This case is only another example of complete arrest of osseous deformity.

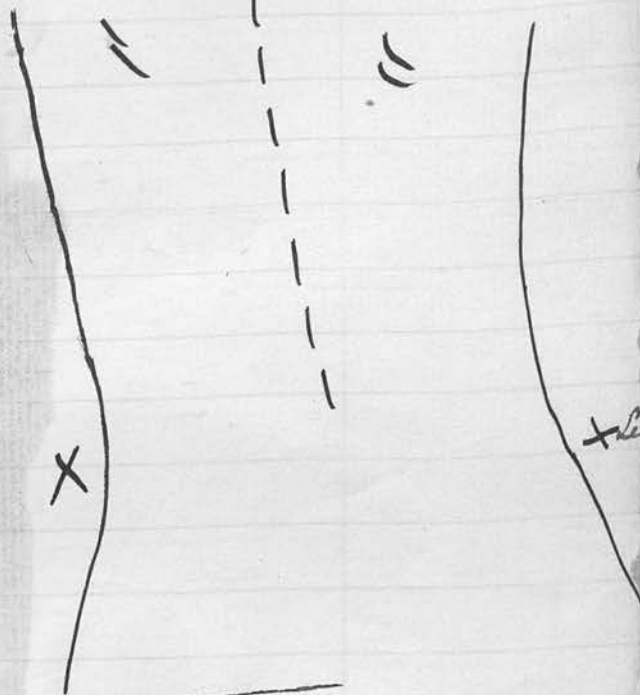
Case X.

Amelia F., aet 20 years. Patient had been delicate as a child. Nine years ago she became very weak in her back. She has never been a whole day free from backache. Pain of a dull aching character in small of back and down at side. She has been wearing a poro-plastic spinal support for several years, but with an injurious result. The muscles of her back have become weak, and indeed, her general health is very much run down. The spinal support was discarded on the arrival of the patient, and she was put under treatment at once. One had to be gentle at first, as she was incapable of doing much work.

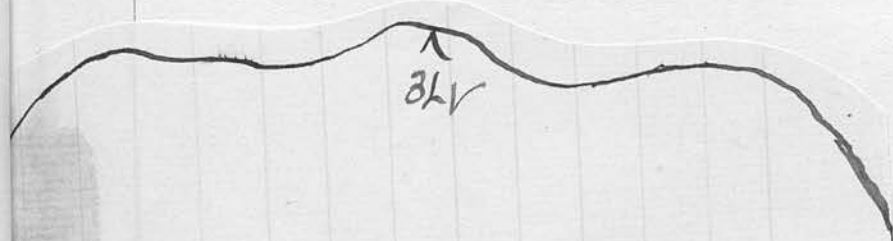
The sketches will, I hope, give you a correct idea of what the girl was like. After a few weeks she became much stronger, and was able to do a good many exercises. "Keynote": Elbows grasped above head, ordered after a month's treatment. At the end of three months she said she felt a different girl./



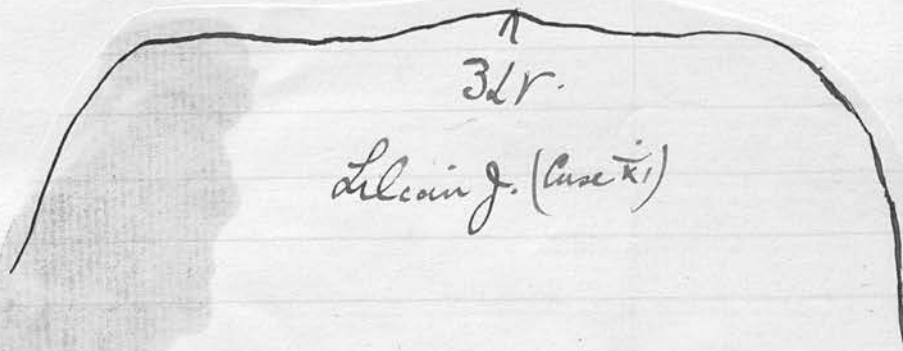
Silvan J. (Case 11)



Flounee J. (Case 11)



Flounee J. (Case 12)



Silvan J. (Case 11)

girl. She was discharged as "relieved".

The above case clearly proves the value of the exercise treatment over the poro-plastic jacket.

Case XI.

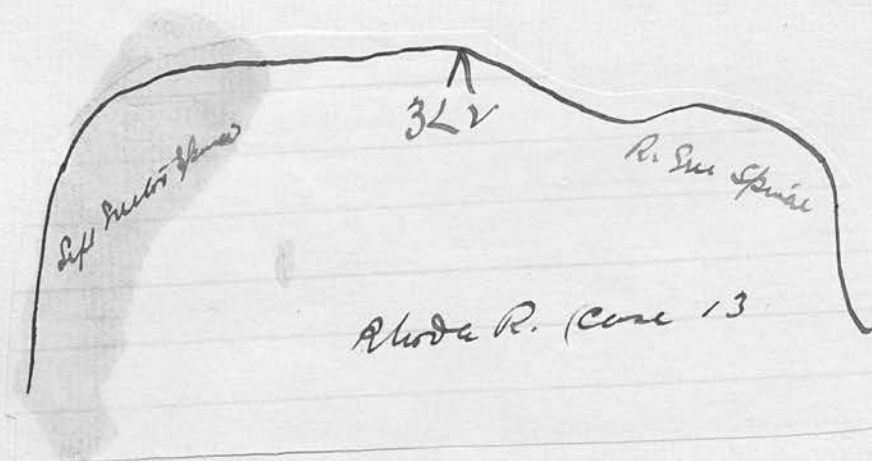
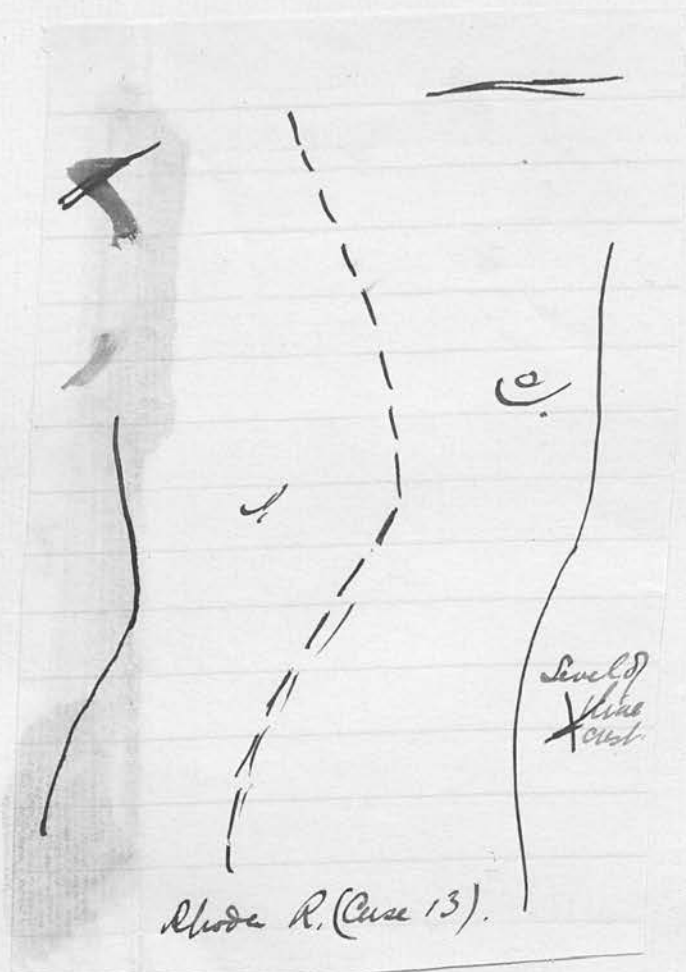
Lilian Jenkins, aet 16 years. Patient was quite well till some months ago, when she twisted her foot. On admission she felt weak and scoliosis was marked. Treatment as usual. Improved after a month's treatment. "Keynote" position: Right arm up, left grasping wrist. This position, which has not been mentioned before, brought the back in the best possible position.

She made marked improvement at the end of three months, when she was discharged with a home prescription.

After three months patient was seen again, and the back found to be most satisfactory. Osseous deformity in statu quo.

Case XII.

Florence J., aet 13 years. Been ill with back for several years, and consulted a medical man two years ago who advised a poro-plastic spine support with several hours rest on a couch during the day. Patient got worse instead of improving, and eventually came/



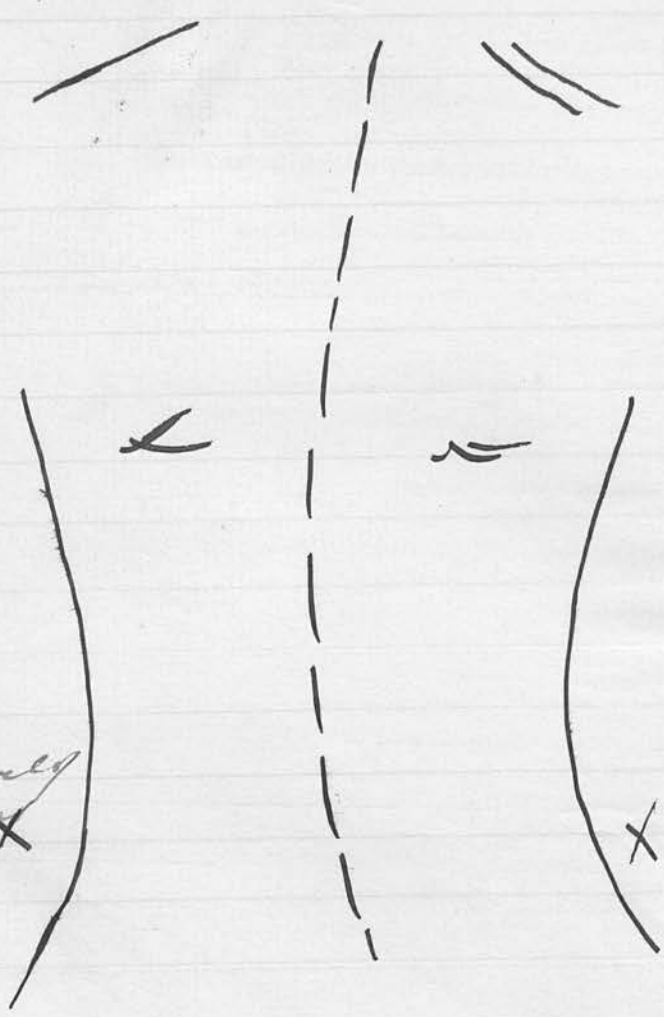
came here. The spinal support was removed, and exercises started. She grew rapidly stronger and lost that dull aching feeling in her back which she experienced before coming here.

"Keynote": Right arm up, left arm out. Patient made satisfactory progress at the end of three months, and we were able to arrest the osseous deformity and make her back stronger. Sketch and tracings will give an accurate idea of her condition on admission.

Case XIII.

Rhoda R. Aet. 13 last July. Curvature was first noticed by mother when patient was eight years old. She was taken to the Cottage Hospital at High Wycome, and a Sayer's jacket applied, which she wore for four years. Patient was also suffering from right non-spasmodic torticollis. Before commencing exercises the sternal head of the right sterno-mastoid was tenotomised and head forcibly straightened. Five days after operation she commenced her treatment.

As will be seen from sketches, there was a good deal of osseous deformity on admission. She continued exercises daily till the end of the first month, when she was re-examined to see which keynote position would suit her best. Left arm up and right arm/



Level 9
Hiccup

Blanche L. (Case 14)

V



3 L V.

Blanche L. (Case 14)

arm out (Keynote position) was the most satisfactory one.

At the end of three months she was examined for a third time, and the neck was found to be symmetrical. The osseous deformity had been arrested and the muscles of the back had become stronger.

The Sayer's jacket had so weakened the patient that only the very simple exercises could be indulged in at first. She soon got stronger and on her discharge was quite as strong as the average scoliolic patient.

On leaving off the hospital exercises it was found that the elbows grasped above head was the best keynote position to start her home exercises. She was seen two months after her discharge and the back was found to be doing well.

Case XIV.

Blanche L., aet 13 years. Two months ago (i.e. before admission) her mother noticed that her right shoulder was more prominent than her left shoulder. Never suffered from backache. The spine showed the reversed S type. Right ribs anteriorly were moderately too prominent. The accompanying sketch will show that the back was not in a bad way when we saw her and was amenable to cure. She was/

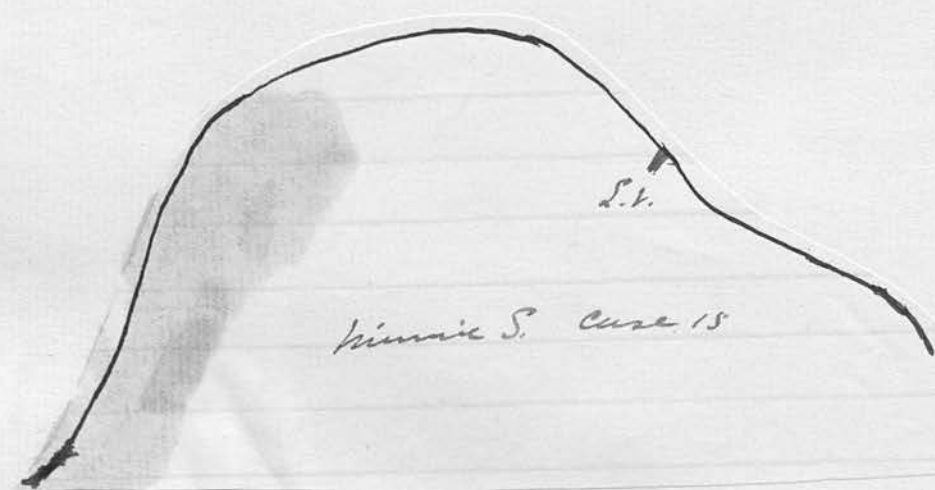
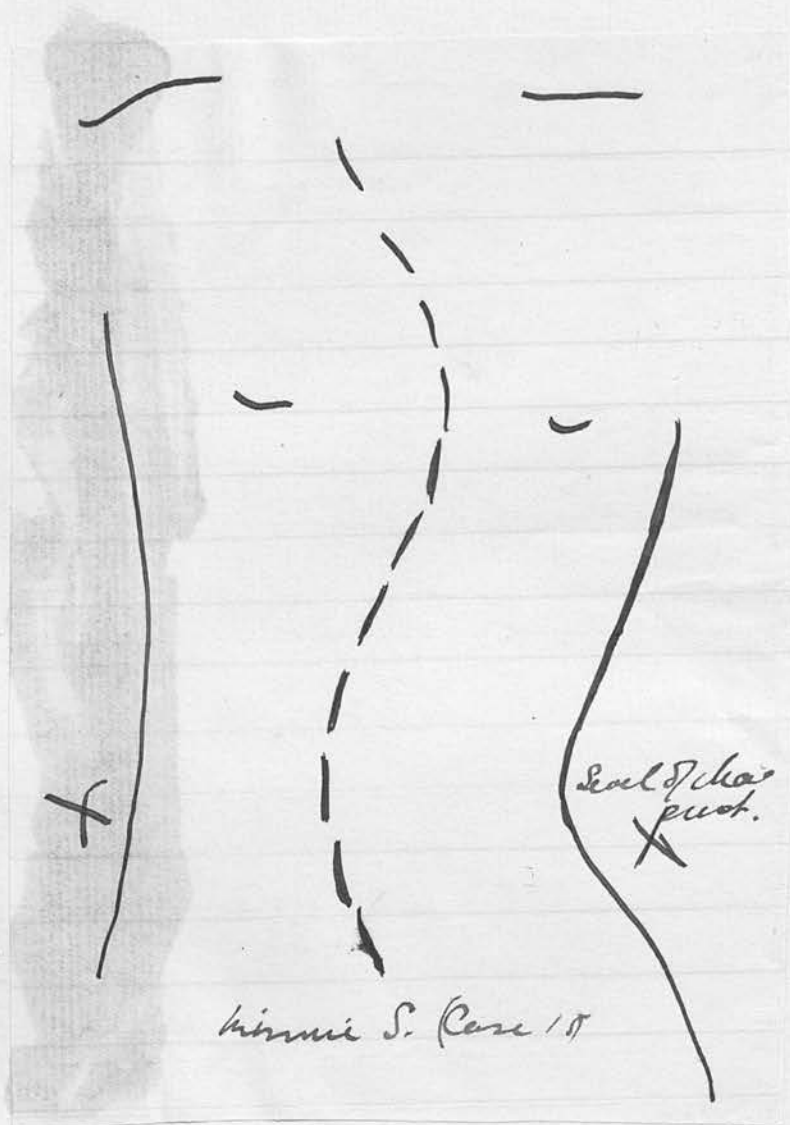
Level 9
Hiccup

Blanche L. (Case 14)

V

3 L V.

Blanche L. (Case 14)

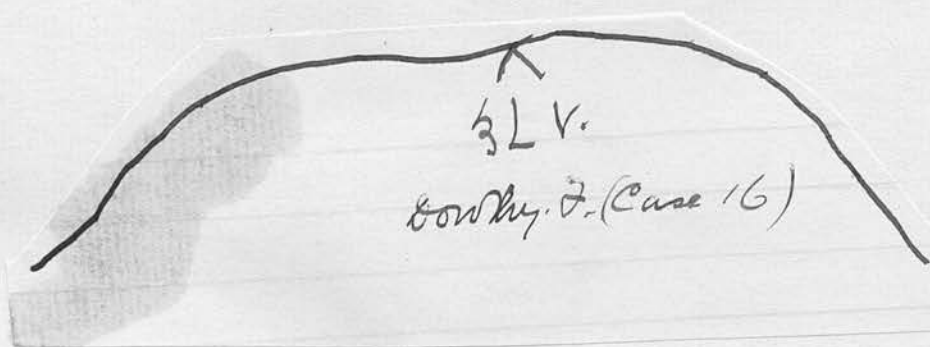
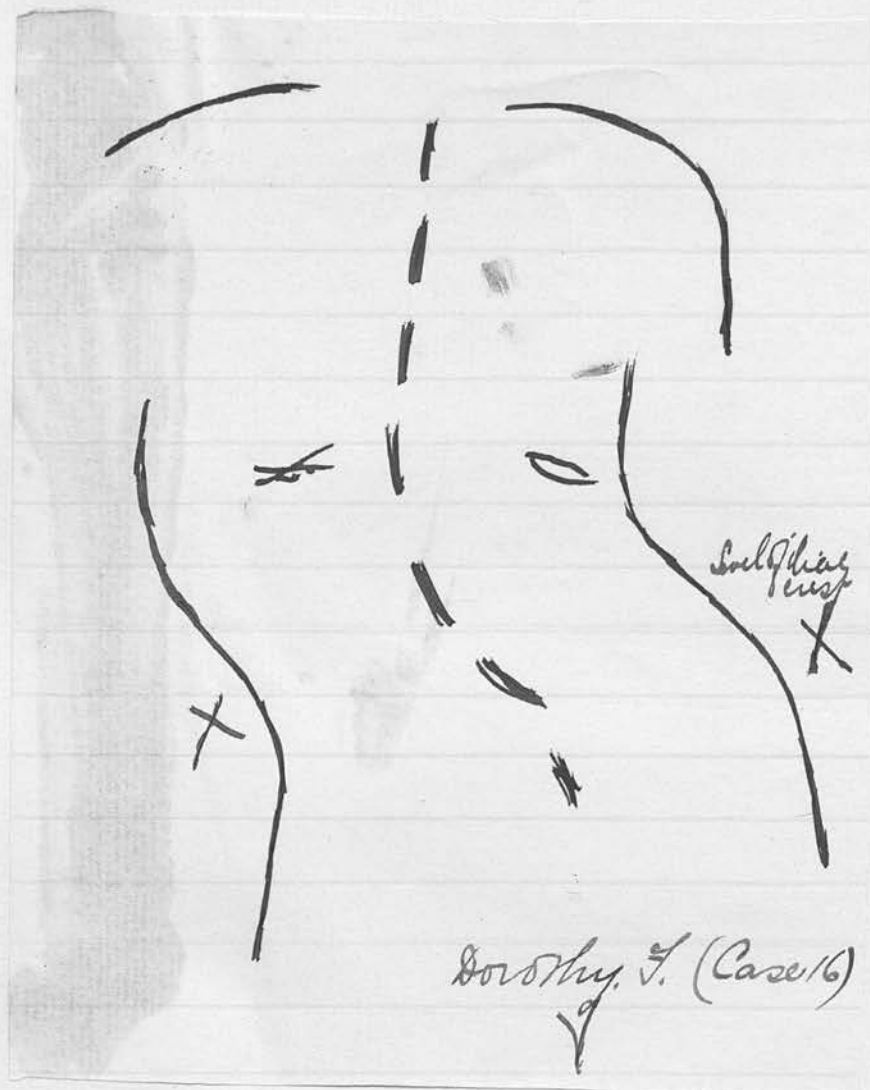


was advised to start exercises next day and was able to do the vigorous ones at the commencement, as she was enjoying good health otherwise.

At the end of a month she was examined again, and the keynote position given her was elbows grasped above head. Her back was found to be making satisfactory progress and the treatment was continued for two months longer. At the end of that time she was examined for a third time and the back was found to be quite straight. She was discharged as cured, and given a home prescription which would prevent any relapse.

Case XV.

Minnie S., aet 17. For four years this patient has been working at the Potteries. Eighteen months ago she noticed that her right hip projected more than her left. She came to me with a letter from her doctor and I found that she had extensive osseous deformity. Her right ribs posteriorly showed moderate deformity, and her left erector spinae extreme deformity. The sketch will give the best idea of the extent of the deformity. She was treated in the usual way, and at the end of a month she was given the following keynote position:
Right/

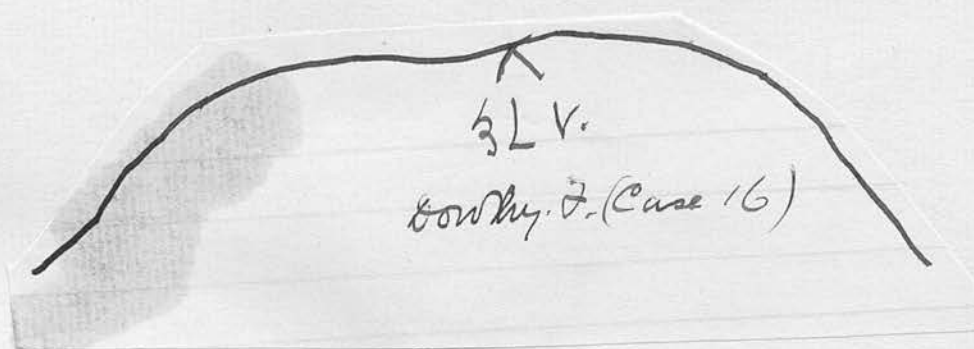
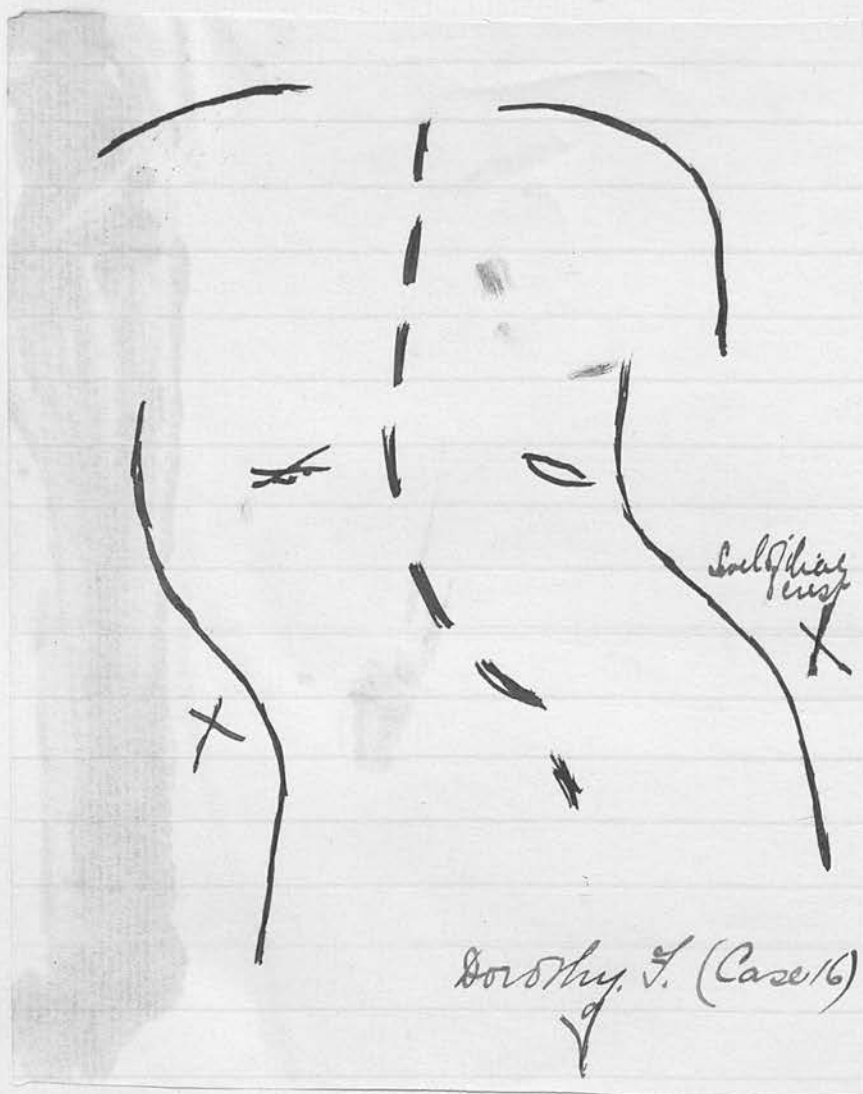


Right arm up and left grasping wrist. After three months' treatment she made marked improvement. She carried herself better, and although no diminution could be effected in the osseous deformity, yet the deformity was so completely arrested and muscular development so marked, that one felt quite satisfied. She was discharged as "relieved" and was seen by me four weeks ago (three months after discharge) when I took a fresh tracing and there was not the slightest increase in the osseous deformity.

Case XVI.

Dorothy F., aet $11\frac{1}{2}$ years. Five years ago a lump was noticed under the left arm. She was taken to a medical man who told her mother she would grow out of it. A short time afterwards her back became crooked and she was taken to another surgeon, who advised lying down all day.

Her spine, which is a very interesting one, shows very marked deformity now and presents the reversed Greek letter **3**), i.e. triple curves, the highest and lowest curves being convex to the right and the middle curve convex to the left. The muscles of her back were very much wasted and she was anaemic. A tonic was prescribed and the daily exercises/



exercises begun.

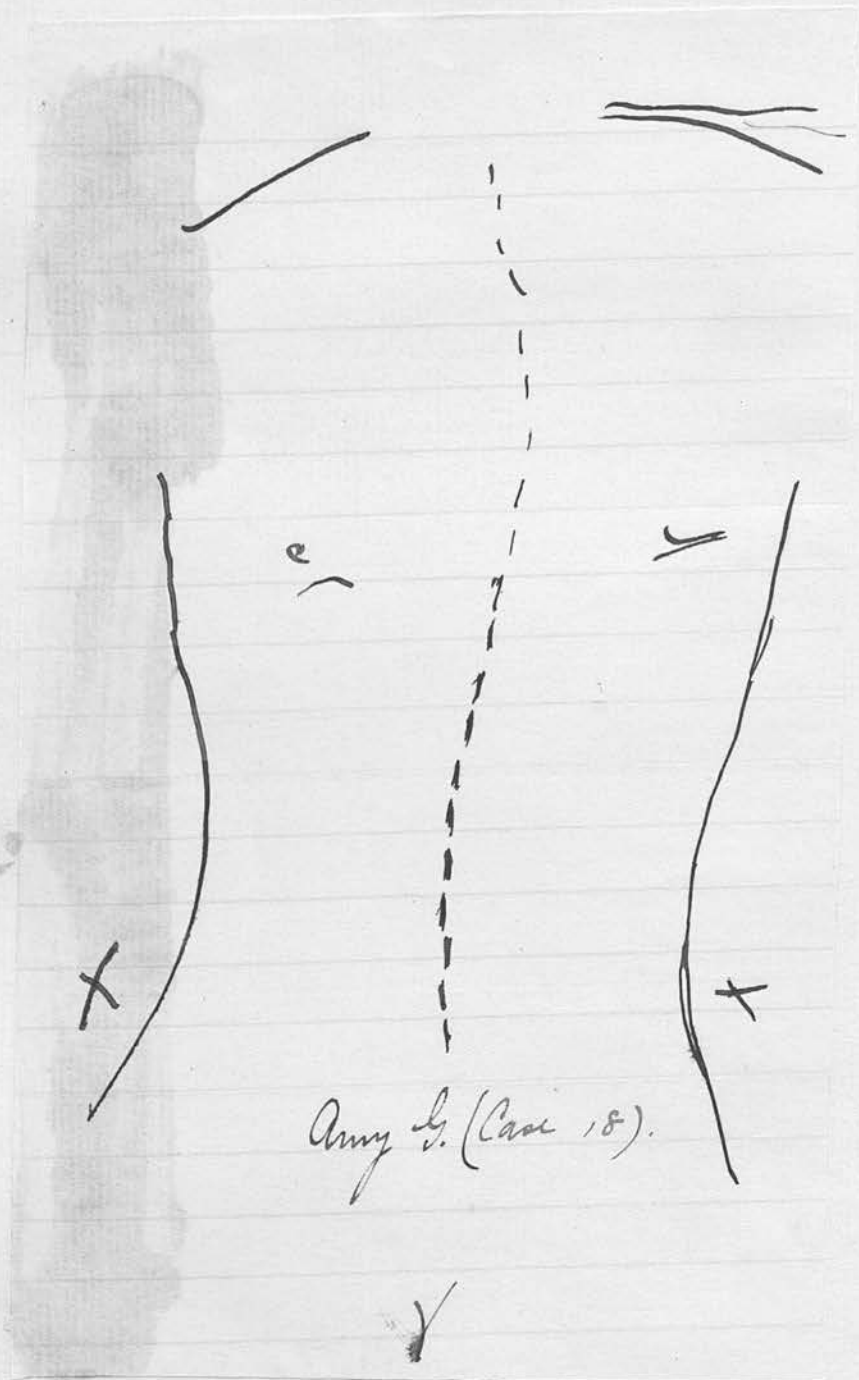
On examination of the ribs, the right ribs posteriorly above the scapulae were moderately prominent, and the left ribs posteriorly below scapulae were severely too prominent. Right erector spinae showed moderate prominence.

After one month's exercises patient was a changed girl. She felt stronger and was therefore able to do the vigorous exercises.

Keynote position: Right arm up, left arm out. At the end of three months she was a strong girl for her age, and the osseous deformity had been completely arrested. I saw her six weeks ago and after taking a tracing, I could find no increase in the deformity.

Case XVII.

James J., aet. 7 years. This patient came to us with marked lateral curvature, as the sketch which I took at the time will show. His mother, who seemed a very careless woman, had noticed the curvature about three years ago, but never consulted a medical man. The osseous deformity was marked and the boy was in very poor condition. Exercises were prescribed with the hope of arresting the osseous/



osseous deformity and making the boy stronger.

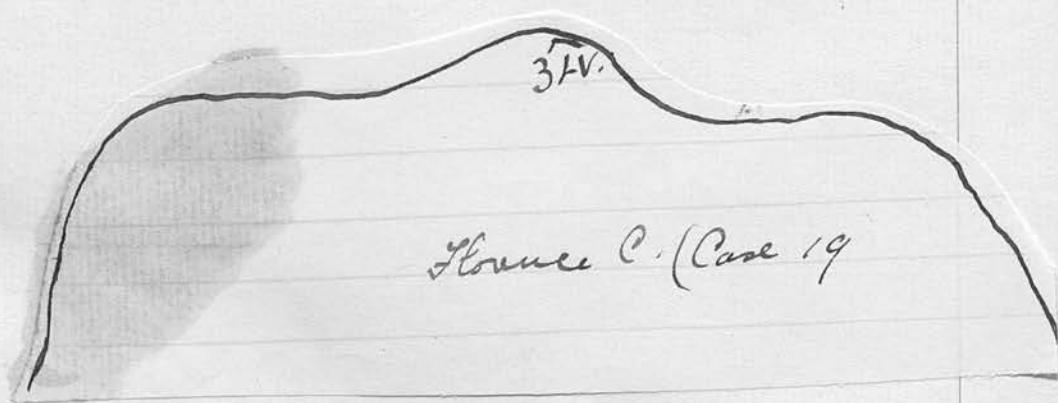
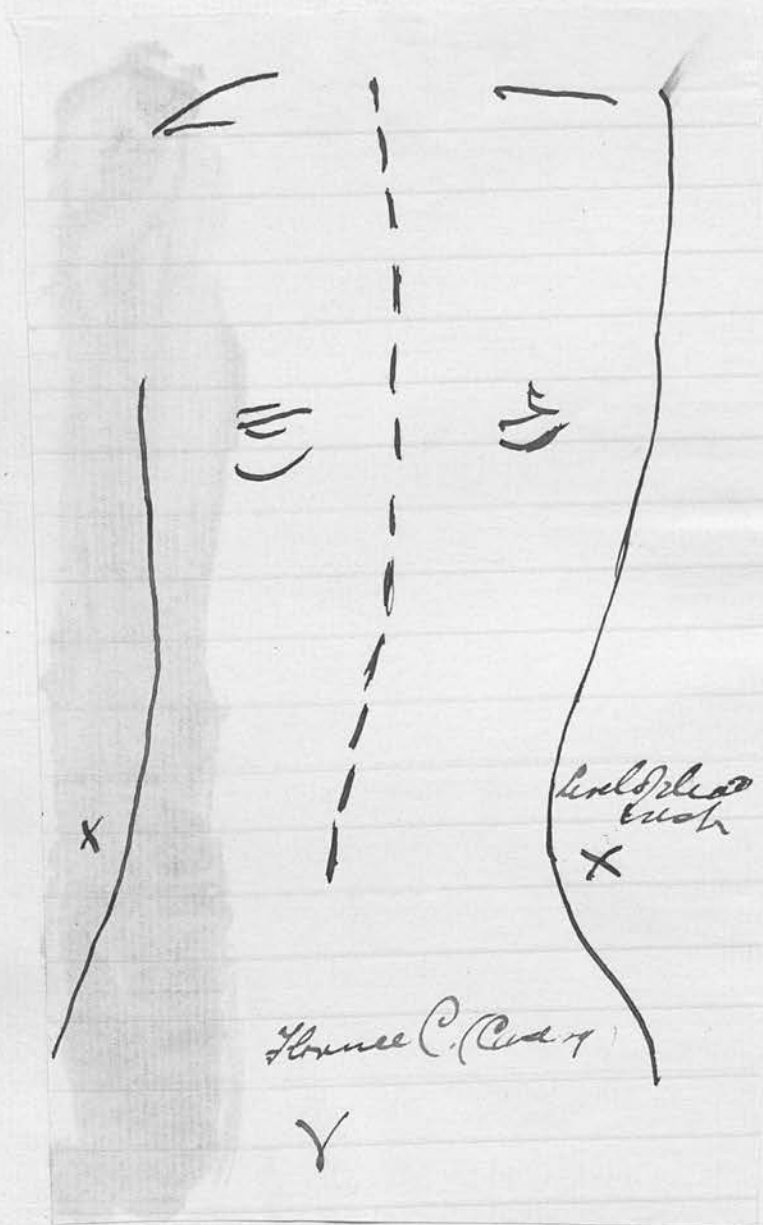
After a month the usual examination was made and he was given his keynote position: Right arm up and left arm out. Improvement continued and at the end of treatment a tracing was again taken and there was no increase in the osseous deformity; the muscles of the back had become stronger and he was altogether a different boy. Result: very satisfactory.

This patient never complained of pain, and the deformity, according to the mother's account, came on gradually.

Case XVIII.

Amy G., aet 21 years. Twelve months ago patient noticed that her right shoulder was somewhat higher than her left shoulder. Six months ago she began to have a dull aching pain in back of neck and down right side. Patient had been a nursemaid for some years and the cause of her curvature I have attributed to carrying the child always on the same side. She was never a strong girl, and the weight of the child was evidently beyond her strength.

Exercises were commenced, and after a month's treatment she was given her keynote position - right arm up, left arm out. From the sketch I made when I/



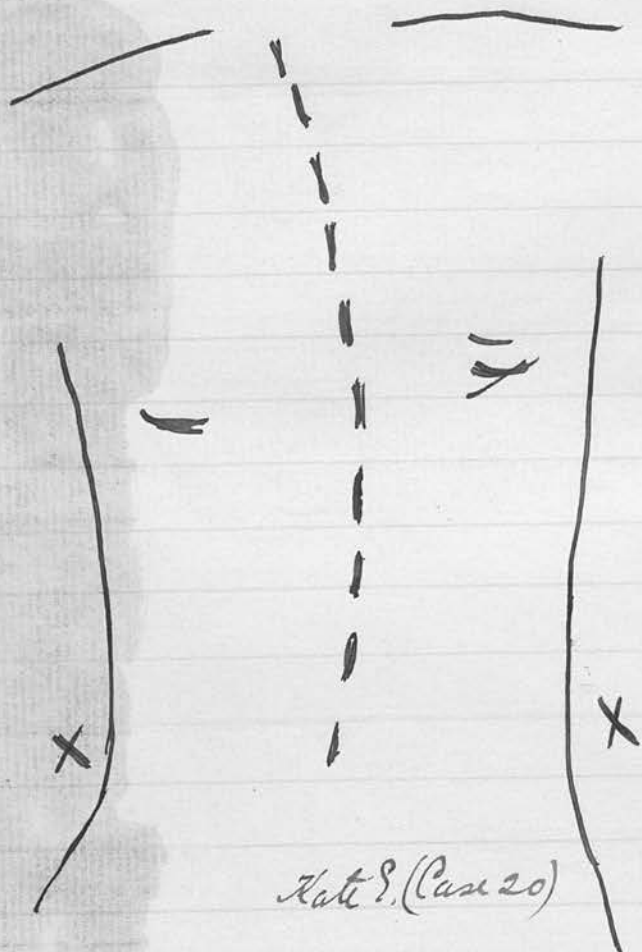
I first saw her you will see that it was not a bad case, one which could be cured. At the end of three months, holding herself in the keynote position one could not detect the slightest curvature.

She was given her home prescription and I saw her two months after her discharge from here and she was doing splendidly. Result: Cure, i.e., if she keeps up her exercises and so prevents any relapse.

Case XIX.

Florence C., aet 18 years. Patient has been a dressmaker for the last three years. She has grown rapidly during the last two years. Six months ago she complained of a dull aching pain between scapulae and this gradually grew worse. On examination, her back was not a severe curvature, but rather one which was amenable to suitable exercises. Exercises commenced soon after I saw her, and at the end of a month the backache had completely disappeared. Keynote position: Elbows grasped above head. This position was the best possible one for this case, as her back seemed quite symmetrical whenever she assumed it.

After three months the result was most satisfactory/



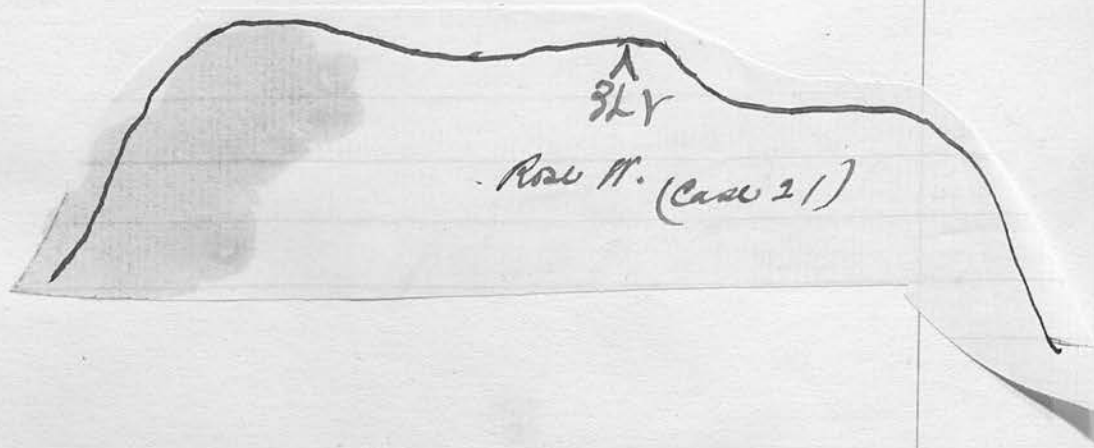
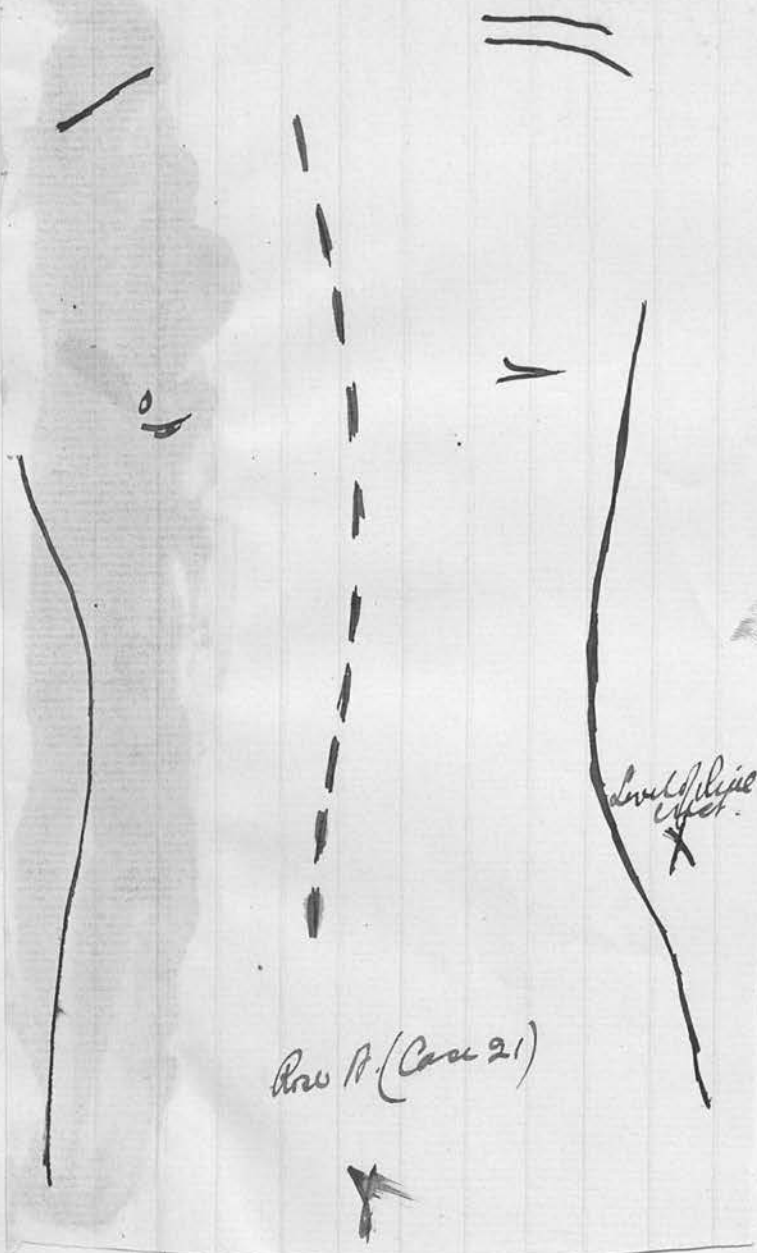
factory and improved greatly in every way. She has only just left my care with the directions to continue the home prescription for twelve months.

Case XX.

Patient has been a Pupil Teacher since she left school. Suffered from a weak back since she was fourteen years old. A year ago patient had a severe illness and the curvature appeared during the convalescence. She had the typical dull aching pain in back.

On examination her right lung was tubercular and she was in a condition of severe emaciation. She was only able to do very little walking and her appetite was very poor, being only able to take a small cup of tea and a slice of toast for breakfast. Her spine was a typical reversed letter 2 . Right ribs posteriorly were moderately too prominent. She was so weak that only two movements, done very gently of each exercise could be allowed. After a month's treatment the keynote position, elbows grasped above head was allowed, and she gradually got stronger and had a better appetite under the influence of the exercises. I prescribed for her phthisis and advised her medically.

At/



At the end of three months she made marked improvement and says that she felt a different woman. The backache had completely disappeared in the meantime.

Case XXI.

Rose W., aet 15 years. Patient had been ill for the last 12 months with severe backache. Occupation, ordinary servant. Back shows the typical gorilla type, the curvature was not very marked, but a trained eye could not help detecting it. The accompanying sketches both of her back and a side view will give a good idea of what she was like when first seen.

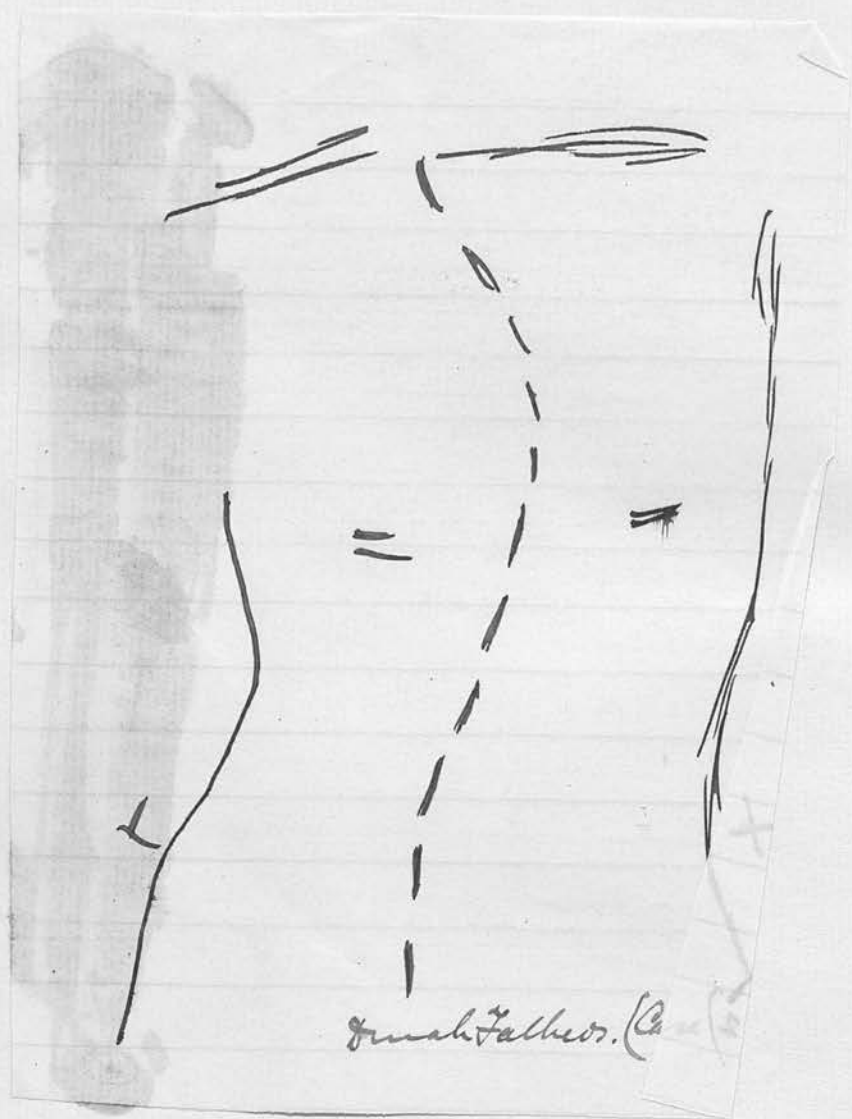
She commenced exercises and before the first month expired every sign of backache had disappeared. At the end of the month her keynote position was given, viz. elbows grasped above head.

With three months treatment this patient made great progress and was discharged a month ago as "relieved". She is to come and see me in two months time.

Case XXII.

Dinah F., aet 13 years. Schoolgirl. Six months ago patient began to suffer backache between the/

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Dinah F. (Case 22)

the scapulae and her mother noticed that her back looked crooked. Patient enjoyed good health, otherwise and was fairly well nourished.

On examination a well marked lateral curvature was to be seen and the osseous deformity was so great that it must have been going on for a longer period than six months. In my opinion it started a couple of years ago. After a month's treatment, keynote - right arm up, left arm out was given, and at the end of three months another tracing was taken, which showed that the osseous deformity had not increased in the slightest. She was given home prescription and told to continue for twelve months.

I hope that the results of the twenty-two cases I have given, which have been under my care, will create a favourable impression on you as regards the value of Medical Exercises in the treatment of Scoliosis.